



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

### Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

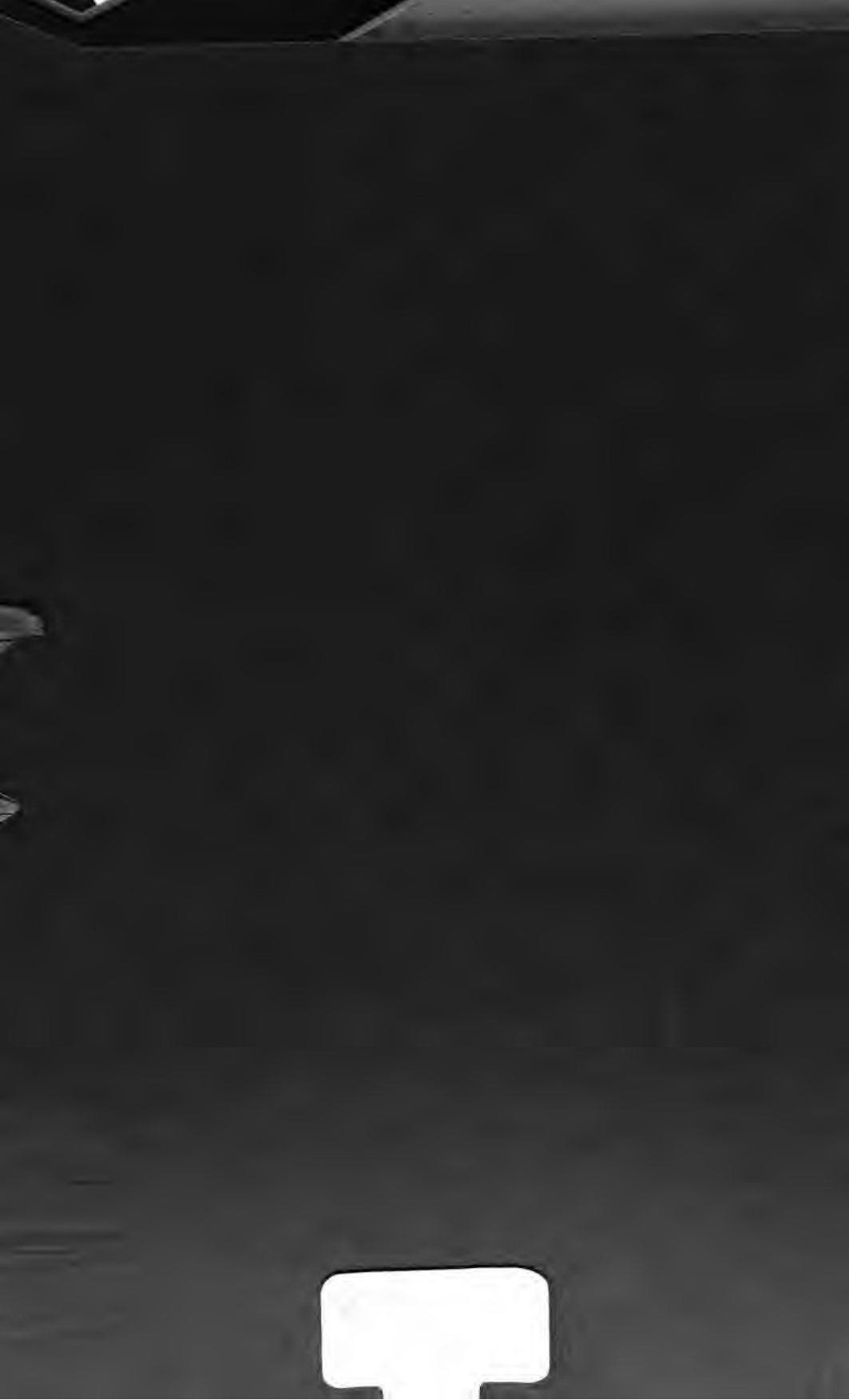
### About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>

B

875,614

ENG  
VM  
1  
.A54  
Index  
v.1-8



JOURNAL  
OF THE  
*American Society of Naval Engineers.*

---

GENERAL INDEX,  
VOLUMES I-VIII.

1889-1896.

---

PUBLISHED BY THE SOCIETY.

---

WASHINGTON, D. C.  
R. BERESFORD, PRINTER, 617 E STREET, N. W.  
1897.



Engin.  
1-1-71

## GENERAL INDEX, VOLUMES I-VIII.

<i>Aberdeen</i> , description.....	444 vii
Accidents to machinery, see Breakdowns of Machinery.	
<i>Aco</i> , description and trials.....	441 vii
Acts of Congress applying to new vessels.....	236 i
<i>Adamastor</i> , description, 606 vii; launch.....	852 viii
<i>Adler</i> , torpedo despatch boat, trial.....	426 ii
<i>Admiral Oushakoff</i> , description, 210 vi, 175 vii; trials.....	839 vii
Admiralty boiler committee, report.....	586 v
<i>Adria</i> , description and launch, 648 viii; trial.....	868 viii
<i>Aegir</i> , description.....	604 vii
<i>Aeolus</i> , description.....	421 ii
<i>Agordat</i> , dimensions.....	199 viii
Air, compressed, see Compressed air.	
Air pressure, effect of, on power.....	743 v
Air pumps.—F. H. Bailey, 518 vi; discussion, 534, 765 vi, 132 vii; Blake "twin" on <i>Minneapolis</i> , 708, 720 vi; data of for U. S. ships, precedes 533 vi; engines, power in proportion to that of main engines.—Towne, 767 vi; valves, without springs.—Forsyth, 539 vi.	
<i>Alabama</i> , proposals, 596; bids, contract and description.....	797 viii
<i>Alabama</i> , S. S.....	858 iv
<i>Alabama</i> , coals of.—Haines.....	118 i
<i>Alarm</i> , description, 832 iv, 510 v; trials.....	748 v
<i>Albatross</i> , U. S. S.—Chief Engineer Isherwood, U. S. N.....	497 vi
<i>Albatross</i> , H. M. S., 32-knot destroyer, builders.....	622 viii
<i>Alberta</i> , cargo steamer.....	860 iv
<i>Albion</i> , description.....	378, 807 viii
<i>Alcedo</i> , description.....	854 vii
Aldrich, W. S.—Spirally welded tubes.....	207 i
<i>Alert</i> , description, 203 vi; trials.....	428 vii, 172 viii
<i>Alexander Holly</i> , description and launch.....	864 viii
<i>Alexandra</i> , speed and power.....	493 vi
<i>Alfonso XIII</i> , particulars and trial.....	168 i
<i>Algerine</i> , description, 615 vi; official trials.....	393 viii
<i>Algou</i> , particulars.....	428 viii
Allderdice, W. H.—Analysis of engine trials, 510 ii; reply to Chief En- gineer Isherwood, U. S. N., 65 iii.	
<i>Alleghany</i> , dimensions.....	193 vii
Allen dense-air ice machine.....	771 iv
<i>Alliance</i> , progressive trials.....	127 i
Alloys, some new.....	489 iii

<i>Alma</i> , description, 191 vii; trials.....	439 vii
<i>Almirante Condel</i> , description and preliminary trials, 585 ii; launch, 237 ii	
<i>Almirante Oquendo</i> , trials.....	841 vii, 638 viii
<i>Almirante Simpson</i> , description and launch, 386 viii; trials.....	611 viii
<i>Almirante Tamanderé</i> , description and cost.....	427 ii
<i>Almy</i> , description and trial.....	131 iv
<i>Alsace</i> , general dimensions.....	196 viii
Aluminum, bronze, 490 iii; steel, 501 iii, 191 v; effect of heat on, 718 v; boat, 1031 v; yacht <i>Vendenesse</i> , 165 vi; torpedo boat, 786 vi.	
<i>America</i> , Italian repair ship.....	76 vii
<i>America</i> , petroleum tank steamer.....	867 iv
<i>America's</i> cup, contest for.....	998 v
American Line S. S. <i>St. Louis</i> , description, 609 vii; trial under Subsidy Act, 843 vii; <i>St. Paul</i> , trial under Subsidy Act, 843 vii.	
American steam vessels.—Stanton.....	633 vii
<i>Amiral Pothuan</i> , description and launch.....	848 viii
<i>Amiral Tréhouart</i> , trials.....	403, 625 viii
<i>Ammiraglio Saint Bon</i> , description.....	196 viii
<i>Amphitrite</i> , H. M. S., description.....	827 viii
Amsler's polar planimeter, description.....	665 v
<i>Anakreon</i> , torpedo-boat, trial.....	426 ii
<i>Andalusia</i> , launch.....	867 viii
Anderson, M. A.—Trial of the <i>New York</i> .....	613 v
<i>Andrea Doria</i> , trial.....	423 ii
<i>Andromeda</i> , description.....	418, 813 vii
Angularity of connecting rod and weight of reciprocating parts, influence of.....	271 i
<i>Anita</i> , description.....	213, 663 viii
<i>Annapolis</i> .....	799 viii
Annual meeting, 1890, 249 ii; 1891, 148 iii; 1892, 141 iv; 1893, 253 v; 1894, 227 vi; 1895, 199 vii; 1896, 220 viii.	
<i>Anson</i> , defects in machinery.....	131 iii
<i>Antelope</i> , trials.....	200 vi
Anti-friction metal, Delta white, tests.....	717 v
<i>Aquila</i> , accident to machinery.....	605 vii
<i>Aquilon</i> , description, 191 viii; official trials.....	405 viii
Architecture navale.—Croneau.....	844 vi
<i>Arcturus</i> , description, 856 vii; trial.....	213 viii
<i>Ardent</i> , description and trial, 168 vii; coal consumption trial.....	423 vii
<i>Arequipa</i> , particulars.....	363 i
<i>Aréthuse</i> , steam pipe explosion.....	785 vi
<i>Aretusa</i> , description and trial.....	208 vi
<i>Argonaut</i> , description.....	827 viii
<i>Argonaute</i> , French torpedo boat.....	619 vi
<i>Argus</i> , description.....	356 i
<i>Ariadne</i> , description.....	827 viii

- Ariete*, machinery details.....182 i  
*Armenia*, description and launch.....648 viii  
 Armored Cruisers, Brazilian, description, 154 vii; Ersatz *Leipzig*, dimensions, 827 vii; *No. 2*, *New York*, 117 iv.  
*Arrogant*, description, 419, 814 vii; launch and particulars.....617 viii  
 Ashlin, H. C.—High pressure compound system for marine engines, 157 viii  
*Assaye*, description.....269 iii  
 Associate members, 1894, 235 vi; 1895, 209 vii; 1896.....229 viii  
*Astræa*, description, 518 v; trial, 199 vi; copper sheathing to be increased, 171 viii.  
*Asturia*, description and trial.....649 viii  
*Atlanta*, law authorizing construction, 236 i; progressive trials, 353 i; space occupied by machinery, 249 i.  
*Atlanta*, passenger steamer, description and launch.....421 viii  
 Atlantic liner, the past, present and future.....99 iv  
 Atlantic, possibilities of speed on.—Biles.....710 v  
 Atlantic record, 609 iii; 494, 792 iv; 1019 v; 597, 790 vi; runs of U. S. S. *Columbia* and various steamers compared, 569 vii.  
*Augusta Victoria*, description, and changes to be made.....862 viii  
*Aurora*, description.....177 vi  
*Australia*, P. & O. Co.....863 iv  
*Australien*, Belleville boilers of, description and management.—Robinson.....372 vii  
 Auxiliary machinery, coal expenditure in naval vessels, 672, 683 iv; effect on economical speed, 66, 474 v; fraction of horse power of main engines, 217 iii; in connection with the modern marine engine, 583 iii; list of, on war vessels, 820 iv; number of engines on *Indiana*, 662 vii, *Maine*, 28 vii, *Terrible*, 598 vii; relation of horse power and revolutions, 675 iv; relative advantages of steam, compressed air, electricity and hydraulic power for, on modern war vessels, 173 iv.  
*Avon*, launch.....844 viii  
 Averaging instrument, Coffin's.....679 v  
 Babcock & Wilcox boiler, evaporative test.....694 vii  
 Bailey, F. H.—Air pumps, 731 v, 518 vi; reply to discussion on, 136 vii; test of, 768 vi.  
 Baird, G. W.—Discussion on air pumps, 132 vii; economical speed, 108 v; preservation of marine boilers, 438 iii; progressive trials of steam barge, 40 i; speed trials of fast ships, 89 ii; trial trips, 170 iii; tubulous boilers, 391 ii. Evaporators, 285 i; new forms of evaporators, 495 ii; test of a horizontal evaporator, 95 viii; preservation of shafts, 364 i; test of coke on *Dolphin*, 736 vi; of George's Creek coal, 329 vii; tests of high service pumping engines, Washington, D. C., 41 i.  
 Baker, C. H.—Obituary notice.....435 viii  
 Baker, J. H.—Obituary notice.....589 ii  
*Baku Standard*, liquid fuel steamer.....417 vi



- Balancing marine engines.....246 iv  
*Ballymena*, yacht, description.....81 i  
*Baltimore*, deterioration of condenser tubes, 114 iv; law authorizing construction, 236 i; machinery space, 249 i; performance and machinery compared with S. S. *Iona*, 685 vi, 53 vii; trials, 337 i, 122 ii.  
*Bancroft*, comparison of trial with calculated I.H.P.—Warrington, 265 vi; launch, 295 iv; particulars, 352 i; standardizing screws, 204 v; trial, 365 v.  
*Bangor*, Fall River steamer.....1087 v  
*Banshee*, description and trial, 424 vii; training ship for engineer's force, 821 vii.  
*Banshee*, paddle steamer, new machinery.....840 vi  
*Barbarossa*, description and launch.....861 viii  
*Barfleur*, description, 131 iii, 829 iv; size and cost, 495 vi; trials.....197 vi  
Barge of Commandant, New York Yard, description and progressive trials, 1 i; discussion, 33 i.  
*Barham*, trials, 421 ii; 517, 743 v; Thornycroft to replace old boilers, 391 viii  
Barnaby, S. W.—Discussion on arrangement of surface of screw propeller, 320 v; on water-tube boilers, 954 v; torpedo boat destroyers, 711 vii.  
Barr, Prof.—Discussion of paper on dryness of steam.....320 vii  
*Barracouta*, description and unsuccessful trial.....232 ii  
*Barrosa*, unsuccessful trial.....583 ii  
*Barrozo*, description and launch.....806 viii  
Bartlett, F. W.—Discussion of paper on Experiment Station and Engineer School.....465 vii  
Barton, J. K.—Contract trials of the *Machias* and *Castine*.....846 v  
Basic Bessemer steel, Navy Department Circular permitting its use, 112 iv; permission rescinded, 196 v; experiments with, 432 iv.  
*Basilisk*, trials.....357 i  
*Bathurst* (Argentine Navy), description and trial.....142 iii  
Battleships, British, first class.—White, 464 v; further experience with.—White, 538 vii; machinery of, 332 vii; relative power and speed of typical, 493 vi; trials, 177 vi.  
German, *Ersatz Preussen*, dimensions.....827 vii  
United States, Act authorizing and description, 409 ii; bids for, and changes in, 575 ii; *Nos. 5 and 6* description, 581, 801 vii; *Seagoing No. 1*, description, 811 iv.  
Comparison of French, English, Russian and United States.....1066 v  
Bayley, W. B.—Electric pumping plant for salt water aquaria at Columbian Exposition.....203 iv  
Beach, E. L.—The accident to the *Ericsson*.....572 vii  
*Beagle*, trials.....357 i  
Beare, T. Hudson.—Discussion of paper on dryness of steam.....318 vii  
*Beatrice*, particulars.....433 viii  
*Bellona*, Thornycroft to replace old boilers.....391 viii

- Bending tests of steel.....764 iv
- Bennett, F. M.—The White patent steam turnabout life launch.....222 ii
- Bennington*, condition of work on, 417 ii; law authorizing construction, 243 i; trial, 206 iii.
- Beresford, Lord Charles.—Water tight doors, 319 viii; reply to discussion, 343 viii
- Bergen*, (double-screw steel ferryboat) experiments made on.....251 ii
- Bessemer steel, basic.....112 iv; 196 v
- Bieg, F. C.—Contract trial of *Katahdin*, 1 viii; data of quadruple expansion engines, 77 i; development of the marine engine (transl.), 151 i; discussion on tubulous boilers, 380 ii; Experiment Station and Engineer School, 449 vii; reply to discussion, 483 vii; forced draft, comparisons, 333 i.
- Biles, J. H.—Discussion on water tight doors, 342 viii; possibilities of speed on the Atlantic, 710 v.
- Bilge drainage.—Worthington.....92 iv
- keels, effects of.—White.....538 vii
- Blair's evaporator.....492 vii
- Blake pumping engine, trial at Newton Water Works.—Dean.....465 v
- Blake*, accident to boilers, 614 viii; description, 599 iii; trials, 121 iv, 508 v; trials after repairs, 168 viii.
- Blanco Encalada*, damage to, by torpedo attack, 102 iv; description and trial, 602 vi, 154 vii.
- Blanche*, defect in propeller shaft and casing.....131 iii
- Blechynden.—Discussion of papers on water tube boilers.....510 viii
- Blenheim*, launch and description, 419 ii; speed.—White, 508 v; trials, 306 ii, 831 iv.
- Blomberg, C. H.—Contribution on Belleville boiler.....119 iii
- Blowers, forced draft, relation of power and revolutions.....680 iv
- Blowers for forced draft, notes on.—J. Thom.....149 viii
- Boats of *Infanta Maria Teresa*.....624 vi
- Boilers (cylindrical, locomotive and general information).  
    and their deterioration, 684 iv; care of.....673 vi  
    Committee, Admiralty, report.....586 v  
    comparison of *Cushing*, *Newark* and *Tripoli*.....378 vi  
    compound marine.—Soliani.....477 viii  
    construction, adapted to forced draft, 229 iii; effect of artificial draft on, 349 iii; marine.—Stromeyer, 890 v.  
    Corliss, description and tests.....299 i  
    cylindrical, factors of safety, 794 vii; formulæ for strength of seams, stays and braces.—Canaga, 269 viii; development of cylindrical heads for, 221 iii.  
    life of.....401 vi  
    retarders in, tests of.—Whitham.....777, 779 viii  
    vs. water tube.—Howden.....373 vi

## Boilers (cylindrical, locomotive and general information).

of *Blake*, accident to, 614 viii; *Carinthia* and *Sylvania*, 847 vii; *Crescent*, *Edgar*, *Jason*, *Monarch*, *Royal Sovereign*, *Sybilie*, *Thrush*, illustrated, follow 606 v; *Friesland*, 406 viii; *Hermione*, evaporative test, 151 vii; *Holland*, 406 viii; *Indiana*, details, 650 vii; *Indiana*, S. S., weight and particulars, 395 vi; Mess. Maritime Co.'s steamers, 151 viii; *Maine*, details, 14 vii; *Norman*, details, 186 vii; *Zeeland*, 406 viii.

defective, in English war vessels, 103 iv; on *Vulcan*.....118 iv  
deposits.....243 iii

details of construction.....701 iv

English naval, particulars.....506 iv

explosion on the *Sarrasin*.....166 vi

joints, riveted, tests of, at Watertown Arsenal.....624 iv

locomotive of *Salamander* to be replaced by water tube, 620 viii; of

*Satellit* compared with *Speedy's*, 394 vi; weight of, 350 vi.

marine, 327 v; marine.—McFarland, 659 vi; marine, care of.—

Forsyth, 574 v.

Navy (English), 273 iv; failures.....496 iv

overheating in the fire surfaces of.....201 ii

preservation of marine, 179 iii; preservation when not in use, regu-

lations of French Navy.....800 iv

power of British and United States warships compared.—Edwards, 30 viii

proportions of, for power developed.—Durstun.....784 vii

scale, rationale of its formation, means of preventing, &c.....685 iv

shop and plant at the Union Iron Works, San Francisco, Cal.....134 ii

shop practice, notes on modern.....129 ii

steel plates, tests of.....132 i

treatment, rules for.....696 iv

tubes, Admiralty tests for, 814 viii; iron vs. steel, 488 iv; leaky, 507 iv;

manufacture and inspection of iron and steel, 301 ii; steel, reasons

for corrosion.—Gibbons, 413 vii; steel to replace copper tubes near-

est fire in British destroyers, 424 vii.

(tests).

Babcock and Wilcox, at Elizabethport, N. J., 694 vii; of *Zenith City*,

765 vii; Belleville of *Wild Duck*, 79 vii; for *Kherson*, 791 vii; com-

parative tests of Ward and Cowles, 414 ii; of Ward & Thornycroft,

581 ii; cylindrical of *Hermione*, 151 vii; *Victory*, 765 vii; Thorny-

croft, trial on *Cushing*, 580 ii.

(tubulous, general information).

cost of water tube, for French Navy.....408 vii

circulation in water tube.—Watkinson, 489 viii; Yarrow & Co.'s

experiments, 133 viii.

tubulous.—S. H. Leonard, 163 ii; discussion, 180, 371, 553 ii; reply

to discussion, 401 ii.

British torpedo boat destroyers fitted with.....796 vii

## Boilers (tubulous, general information).

comparison of, on *Bugeaud*, *Chasseloup-Laubat* and *Friant*.....408 vii  
 in French Navy.—Robison.....365 vii  
 relative efficiency of various types.....124 vii  
 vessels for training men in management of.....821 vii  
 water tube, by Milton, 931 v; by Soliani, 97 vii; by Watt.....481 viii  
 (tubulous, various types).

d'Allest, 103 iv; experimental trials of, 368 vi; of *Bouvines*, 402, 604 vii; old and new types, 388 vii.

Almy, of *Alcedo*, 854 viii; *Anita*, 213 viii; *Arcturus*, 856 vii; *Calypso*, 631 vii; *Free Lance*, 628 vii; *Giralda*, 432 viii; *Illawara*, 215 viii; *Parthenia*, 661 viii; *Peregrine*, 630 vii.

Anderson and Lyall.....360 vi.

Babcock and Wilcox, evaporative test, 694 vii; of *Cameo*, 769 viii; *Chicago*, 383 viii; *Hero*, 619 vii, 769 viii; *Grand Duchess*, 207 viii; *Nero*, 935 v, 395 vi, 769 viii; *Queen City*, 208, 652 viii; *Scottish Hero*, 852 vii; *Sovereign*, 659 viii; *Turret Cape*, 620 vii; yacht, 434 viii; *Zenith City*, 621, 765 vii.

Belleville and their applicability to ocean-going vessels, 246 iii; and Ericsson compound engine, 445 ii; data and test of, 564 ii; description, 941 v; description and management of.—Robison, 365 vii; discussion on, 371 ii; experiments with, for marine machinery, 119 iii; of *Andromeda*, 813 vii; *Armand Béhic*, 380 vi; *Brennus*, 187 viii; British cruisers, new, 418 vii; *Buda Pesth*, 811 vii; French Navy, 933 v; German cruiser *K*, 553 viii; *Kherson*, 618, 791 vii; merchant service, 934 v; Mess. Mar. Co.'s steamers, 151 viii; *Ohio*, 619 vii; *Pascal*, 189 viii; *Polynésien*, 380, 395 vi; *Powerful* and *Terrible*, 197 vi; *Powerful*, evaporative test of two, and method of firing, 822, 825 viii; *Sharpshooter*, 1031 v, 202, 407, 414, 591 vi, 901 vii, 379 viii; *Terrible*, 593 vii; *Thames*, 636 vi; *Vindictive*, 170 viii; *Wild Duck*, 79 vii.

Blechynden, 365 vi; of *Scud*, 662, 874 viii; *Starfish*.....818 vii

Bureau Steam Engineering, of *Torpedo Boat No. 3*.....799 viii

Du Temple, 946 v; of *Spanker*, 821 vii, 392, 835 viii; tests of, for torpedo boats, 786 viii.

Dürr, 361 vi; of German cruiser *L*.....553 viii

Fleming and Ferguson, 358 vi; of *Aberdeen*.....642 vi, 444 vii

Lagrafel-d'Allest, 938 v; description and management.—Robison, 365, 402 vii; test, 949 v; of *Bouvines*, test, 402 vii; *Carnot*, 385 vii; *Chasseloup-Laubat*, cost, 408 vii; *Du Chayla*, 188 viii; d'Estrées, 190 viii; *Infernet* and *K*, 190 viii; *Jauréguiberry*, 617 vi, accident to, 624 viii; *Masséna*, 603 vii.

Mosher, of *Feiseen*, 765 v; yacht.....874 viii

Niclausse, description and management of.—Robison, 365, 402 vii; of *Cristobal Colon*, 854 viii; *Ersatz Freya*, 553 viii; *Friant*, 172 vii; cost, 408 vii; power and consumption trials, 375 viii; *Halcyon*, class, 803 vi; *Seagull*, 172 viii.

## Boilers (tubulous, various types).

- Normand, 491 iv, 946 v; of *Aquilon*, 191 viii; *Banshee*, *Contest*, *Dragon*, 424 vii; *Dunois* and *La Hire*, 190 viii; *Pelorus*, 601 vii; *Rocket*, *Shark*, *Surly*, 423 vii, 177, 179 viii; *Rocket's* boilers to have steel tubes, 621 viii; *Torpedo Boat No. 149*, 491 iv.
- Oriolle, .....940 v
- Reed, of *Janus*, *Lightning* and *Porcupine*.....839 viii
- Roberts, of *General Nerino*.....202 viii
- Seabury, of *Beatrice* and *Kanawha*, 433 viii; *Hiawatha*, 214 viii; *Huntress*, 630 vii; *Willa-Walla*, 661 viii.
- Seaton.....363 vi
- Serpellet, and superheated steam.....188 iii
- Thornycroft, 945 v; circulation in, 349 vi; comparison of boilers of *Cushing*, *Newark* and *Tripoli*, 378 vi; comparison of weight with that of locomotive, 350 vi; locomotive of *Satellit* compared with *Speedy's*, 394 vi; new design, 156 vi; test of a model, 730 vii; weight, 167 v; of *Aegir*, 604 vii, 553 viii; *Ariete*, 182 i; *Barham* and *Bellona*, 391 viii; *Daring*, weight, 725 vii; *Geiser*, 163 v; *Natter*, 806 viii; *Oneonta*, 630 vii; *Proserpine*, 815 vii.
- Towne, of *William Windom*.....988 v
- Ward, of *Monterey*.....127 v
- Warrington, of F. W. Morgan's yacht.....212 viii
- West, of *Wachusetts*.....663 viii
- White.....365 vi
- Yarrow, 947 v, 363 vi; notes on, 589 viii; test of, 163 vi; of Argentine destroyers, 609, 804 viii; *Fei Ying*, 811 vii; *Friesland*, *Holland* and *Zeeland*, 829 vii, 406, 792 viii; *Hornet*, 391 vi; *Salmon*, 817 vii; *Sokol*, 606, 833 vii; *Viper*, 806 viii.

(weights).

- Belleville and cylindrical, of *Kherson*, *St. Petersburg* and *Renown* compared, 639 viii; Blechynden of *Scud*, 874 viii; British naval.—Durstun, 348, 364 vii; cylindrical, weight and particulars, 395 vi, of *New York*, 661 vi; cylindrical and water-tube in the *Monterey*, 662 vi; different types, 411 vi; Du Temple, of torpedo boats, 787 viii; *Spanker*, 835 viii; locomotive of *Satellit*, 394 vi; Niclausse of *Cristobal Colon*, 854 viii; per I.H.P. on some British vessels, 567, 568 viii; Thornycroft of *Speedy*, 394 vi; Yarrow of *Hornet*, 391 vi.

## Book Review.

- Alternating currents.—Bedell and Crehore.....529 v
- Alternating currents.—Kapp.....529 v
- American steam vessels.—Samuel Ward Stanton.....633 vii
- A manual of naval architecture.—White.....443 vi
- Architecture navale.—Croneau.....844 vi
- Busley's naval and merchant steamers.....528 v
- Compressed air.—Kennedy and Unwin.....873 iv

## Book Review.

- Continuous current dynamos and motors.....1097 v  
 Dictionary of electrical words, terms and phrases.—Houston.....646 vi  
 Die technische Entwicklung des Norddeutschen-Lloyds.—Busley and  
   Haack.....226 vi  
 Electricity one hundred years ago and to-day.—Houston.....646 vi  
 Electricity and magnetism.....252 v  
 Electrical tables and memoranda.—Thompson.....528 v  
 "Engineering" for April 21, 1893.....527 v  
 Hand-book of the steam engine.....1095 v  
 Howell's steam vessels and marine engines.....217 viii  
 Logarithmic tables.....251 v  
 Mechanical engineer's pocket book.—Clark.....143 iv  
 Practical instructions for using the steam-engine indicator.....1096 v  
 Pray's steam tables and engine constants.....845 vi  
 Proceedings of the division of marine and naval engineering and naval  
   architecture of the International Engineering Congress.....224 vi  
 Resistance of ships and screw propulsion.....1094 v  
 Seaton and Roundthwaite's pocket book.....443 vi  
 Standard tables for electric wiremen.....1098 v  
*Bonaventure*, trials.....803 vi  
*Boston*, law authorizing construction, 236 i; machinery space, 249 i; pro-  
   gressive trials, 252, 354 i.  
 Bourke (Capt.).—Defense of, on loss of *Victoria*.....93 vi  
*Bouvet*, launch and description.....623 viii  
*Bouvines*, description, 235 ii; test of D'Allest boilers, 402 vii; trials, 403,  
   604 vii.  
*Boxer*, trial.....169, 715 vii  
*Brandenburg*, catastrophe.....416 vi  
*Brazen*, general data, 820 vii; launch.....621 viii  
 Brazil, armored cruisers building in France, 154 vii; torpedo boats,  
   Schichau, dimensions, 418 vii.  
 Breakdowns of machinery (see also Casualties and repairs), *Aquila*,  
   605 vii; *Blake*, boilers, 614 viii; *Cassini*, eccentrics and propellers, 191  
   viii; *Charleston*, 789 vii; *Concord*, main steam pipe, 399 iii; repairing  
   a broken valve chest, 761 vi; *City of Lincoln*, steam pipe explosion,  
   351 v; *Desperate*, I.P. engine, on trial, 621 viii; *Elbe* and *Lahn*, copper  
   steam pipe, 410 iii; *Ericsson*, 572 vii; *Fleurus*, 173 vii; French torpedo  
   boat No. 73, 430 vii; *Jauréguiberry*, boilers, on trial, 624 viii; *La*  
   *Gascogne*, 139 vii; *Lansquenet*, 430 vii; *Latouche-Treville*, 172 vii;  
   *Lynx*, 170 vii; *Opossum*, after repairs, 843 viii; *Powerful*, on trial, 827  
   viii; *Rocket*, 621 viii; *Seagull*, 457 iii; *Shark*, 170 vii; *Skate*, propeller  
   bracket, on trial, 620 viii; *St. Paul*, steam pipe, 155 viii; *Terrible*, on  
   trial, 811 viii; *Trave*, broken shaft, 188 v; *Umbria*, repairing broken  
   shaft, 185 v; in fleet manœuvres of French Navy in 1890, 280 iii.  
*Bremen*, description.....861 viii

- Brennus*, description and launch, 601 iii; description, 806 vi; trials and defects in hull, 186 vii.
- Brilliant*, description, 421 ii; trial.....832 iv
- Briquettes, French, test of, on U. S. S. *Ranger*.....578 vii
- British naval manœuvres, 1892, 786 iv; Navy, engineering in.—Durston, 779 vii; warships, the machinery of.—Durston, 332 vii.
- Bromo*, particulars.....78 i
- Bronze, aluminum, 490 iii; deoxidized, 497 iii; manganese, 491 iii; phosphor, 495 iii; silicon, 498 iii.
- Brooklyn*, bids for, 201 v; description, 805 iv; launch, 804 vii; trial...741 viii
- Bruix*, description 235 ii, 841 iv; cost and weight.....422 ii
- Bruiser*, trials.....419 vii
- Bryan, B. C.—Notes on the effect of temperature on certain properties of various metals and alloys, 144 ii; practical application of formulæ for finding the turning effort on the crank shaft of an engine, 334 vi.
- Buda Pesth*, dimensions of Belleville boilers, 811 vii; launch and particulars, 610 viii.
- Buenos Aires*, description and trial, 806 vii; machinery particulars.....607 viii
- Buenos Aires*, S. S., particulars.....78 i
- Bugeaud*, comparison of her Belleville boilers with D'Allest and Niclausse boilers, 408 vii; description, 519 iv; launch and dimensions, 1064 v; trials, 404 viii; weights of machinery, 409 vii.
- Bulkheads, ships', scantlings of, and method of stiffening.....787 iv
- Burd, Geo. E.—Discussion on engine-room signals.....446 iii
- Bursting of *Concord's* main steam pipe.....399 iii
- Bursting of copper steam pipes of the steamers *Elbe* and *Lahn*.....410 iii
- Busley, Carl.—Development of the marine engine, 151 i; on spacious fire rooms of *Hohenzollern*, 432 vii; opinion on triple screw vessels, 782 viii.
- By-laws of American Society of Naval Engineers.....144 iv
- Cæsar*, dimensions, 423 vi; launch.....810 viii
- Caledonia*, description.....643 vi, 192 vii
- Calorimeters, determination of the dryness of steam.—Unwin, 297 vii; reliability of throttling.—Denton, 98 viii; test of throttling.—Jacobus, 141 vii.
- Calvert, George A.—Measurement of wake currents.....869 v
- Calypso*, description.....631 vii
- Cambrian*, description.....510 v
- Campania*, best speed, 1019 v; comparison with *Great Eastern*, 810 v; description and launch, 852 iv; description, full, 385 v; dimensions, 810 v; first voyage, 409, 754 v; height of smoke pipes, 247 v; record voyage, 438, 597, 790 vi; speed, 818 v; speed trials, 405 v.
- Camperdown*, coal endurance, 133 iii; injury to, 107 vi; repairs to.....1041 v
- Canadian Atlantic service, steamers for.....642 vi
- Canadian Pacific Railway Steamers (*Empress of India*, *China* and *Japan*), particulars.....363 i

- Canaga, A. B.—Formulæ for strength of seams, stays and braces for cylindrical boilers, 269 viii; graphic determination of crank effort, 271 i; graphic method of determining and counterbalancing the centrifugal action of the connecting rod, 433 ii.
- Canopus*, description.....378, 807 viii
- Cape Ann*, description.....624 vii
- Capitan Muniz Gamero*, launch, 386 viii; trial.....807 viii
- Capitan Orella*, launch, 386 viii; trial.....807 viii
- Capitan Prat*, description, 287 iii, 128 iv; description and trial, 231 v; voyage from Toulon to Talcahuano, 1066 v.
- Capper, D. S.—Test of a model Thornycroft boiler.....730 vii
- Caprera*, description, 620 vi; trials.....832 vii
- Car ferry *Sainte Marie*.....759 v
- Caramuru*, launch and particulars.....611 viii
- Carbonic acid refrigerating machinery.....783 iv
- Carinthia*, description and trial.....843 vii
- Carlo Alberto*, launch and particulars.....850 viii
- Carlos V*, description.....434 vii, 201 viii
- Carlaw*, description and trial.....656 viii
- Carney, R. E.—Contract trial of the *Olympia*.....241 vi
- Carnot*, D'Allest boilers, description and weights, 385 vii; description, 618 vi, 401 viii; preliminary trials, 625 viii.
- Carr, C. A.—Contract trial of the *Marblehead*, 129 vi; discussion on trial trips 177 iii; Speed curves of United States naval vessels, 555 iii; the failure of steel castings for the *Maine* and *Cruiser No. 11* (*Marblehead*), 83 iv.
- Carter, T. F.—Triple-screw cruiser *Columbia*.....I vi
- Casabianca*, description, 206 vi; preliminary trial.....405 viii
- Cassard*, description, 204 vi; launch.....626 viii
- Cassini*, breakdowns of machinery, 191 viii; trials.....430 vii, 405 viii
- Cast steel piston, failure of a, on *Charleston*.....789 vii
- Castine*, alterations, 176 vi; launch, 294 iv; trial.....846 v
- Castings, steel.—Hollis, 193 i; failure of, for *Maine* and *Cruiser No. 11*.—Carr, 83 iv; expense attending use, 205 i; manufacture of open-hearth.—Hall, 185 i; mixtures for, 191, 193 i; tensile tests and analyses, 191, 206 i.
- Casualties and repairs (see also Breakdowns of machinery), breakdown of air pump gear.—Kearney, 248 i; dressing up pillow blocks.—Leonard, 174 i; examination of *Lancaster's* injection valve.—Gage, 88 i; preservation of shafts, 364 i; repair of a broken crankpin, 456 iii; slow combustion of iron, 364 i.
- Catania*, description.....628 vii
- Catlicart, W. L.—Discussion of paper on Experiment Station and Engineer School.....463 vii
- Catinat*, description.....205 vi, 849 viii
- Cawley.—Discussion of paper on dryness of steam.....321 vii



- Cécille*, description and trial, 135 iii; particulars, 314 iv; trials.....180 i
- Centaur*, description.....134 iii
- Centrifugal pump, theory of the.—Leopold, 335, 483 iii; most suitable form of vane for.—Leopold, 559 iii.
- Centurion*, ordnance trials, 168 vi; size and cost, 495 vi; trials.....1044 v
- Cevic*, description.....1076 v
- Chalker, J. H.—Discussion on tubulous boilers.....557 ii
- Chambers, W. H.—Contract trial of the *Philadelphia*, 524 ii; discussion on trial trips, 175 iii.
- Chanzy*, cost and weights, 422 ii; description.....236 ii, 841 iv
- Charles Martel*, launch and description, 1063 v; preliminary trials.....847 viii
- Charlemagne*, description.....427 vi, 823 vii
- Charleston*, coal expenditure, 70 v, 686 vi; failure of a cast steel piston, 789 vii; law authorizing construction, 237 i; particulars of machinery, follow 652 vi; trials, 250, 310 i.
- Charner*, cost and weights, 422 ii; description.....235 ii, 841 iv
- Charybdis*, trial .....605 vi
- Chasseloup-Laubat*, comparison of her D'Allest boilers with Belleville and Niclausse boilers, 408 vii; trial, 429 vii; weights of machinery, 409 vii.
- Chateaufrenault*, general data.....825 vii
- Chemical means of measuring feed and circulating water.—Stromeyer, 517 viii
- Chesapeake*, description, 624 vii; trial.....853 vii
- Chevalier*, torpedo boat, description.....585 vi
- Chicago*, law authorizing construction, 236 i; machinery space, 249 i; new engines and Babcock & Wilcox boilers, 383 viii; progressive trials, 354 i.
- Chicora*, lake steamer, description and trials.....865 iv
- Chili.—Orders four 30-knot destroyers.....811 vii
- China.—Three cruisers for, particulars.....612 viii
- China*, particulars.....422 viii
- Chishima-Kan*, Japanese Navy, torpedo gun vessel.....318 iv
- Chiyoda*, description.....428 ii
- Christopher Columbus*, whaleback, description.....240 v
- Chrome steel.....503 iii
- Cincinnati*, 349 i, 293 iv; launch and description, 817 iv; running lines for shafting, 1 v.
- Circulation in water tube boilers.—Watkinson, 489 viii; Yarrow & Co.'s experiments, 133 viii.
- Circulating pumps.—Leopold.....295 v
- Circe*, description, 533 iv, 510 v; trials.....512 v
- City of Bangor*, description and launch .....424 viii
- City of Buffalo*, description.....428 viii
- City of Lincoln*, steam pipe explosion.....351 v
- City of Lowell*, description, 1083 v; speed.....633 vi
- City of New York* and *City of Paris* (see *New York* and *Paris*), Act authorizing an American register.....320 iv

- City of Venice*, particulars.....79 i
- Clark.—Discussion of paper on dryness of steam.....324 vii
- Clarkson.—Discussion of paper on dryness of steam.....319 vii
- Classification Society, new.....661 v
- Classification of United States naval vessels according to displacement...113 iv
- Cleveland Shipbuilding Co.—Lake steamers, dimensions.....178 vii
- Clinometer, Webster's.....348 iii
- Coal, combustion of, distribution of the total heat of.....548 iv
- combination with liquid fuel.....415 vi
- consumption in men of war, 109 iv; on vessels of the French Navy, instructions for determining the, 406 ii; relative, of triple expansion and compound engines, 782 iv; requirements for new British destroyers, 399 viii.
- consumption trials, *Alert*, 172 viii; *Ardent*, 423 vii; *Brennus*, 384 vii; *Bruiser*, 419 vii; *Crescent*, 415 vii; *Descartes*, 849 viii; *Diana*, 833 viii; *Grafton*, 415 vii; *Indiana*, 666 vii; *L. C. Waldo*, 858 viii; *Magnificent*, 811 vii; *Majestic*, 812 vii; *Meteor*, 235 i; *Minerva*, 832 viii; *Minneapolis*, 713 vi; *New York* 635 v; *Pascal*, 849 viii; *Powerful*, 812 viii; *Prince George*, 809 viii; *Royal Arthur*, 347 vii; *Royal Sovereign*, 347 vii; *Sharpshooter*, 415 vii; *Sirius*, 363 vii; *Speedy*, 415 vii; *Starfish*, 818 vii; *Terrible*, 811 viii; *Torch*, 172 viii; *Venus*, 830 viii; *Victorious*, 808 viii.
- endurance and machinery of new United States cruisers, 637 iv; endurance, theoretical and practical, of English war vessels, 133 iii.
- expenditure for all purposes on *Charleston*, 686 vi; kinds of, qualities, and method of burning to greatest advantage, 740 iv; spontaneous ignition of, 577 iii; supply of our new cruisers, 796 iv.
- Coal in Tonquin.....125 iii
- Coal, test of George's Creek, on *Dolphin*.—Baird.....329 vii
- Coals, Alabama.—Haines, 118 i; Chilian, 70 i; Nanaimo, 72 i; Pacific Coast, Roelker's notes, 69 i; Sandy Point, 71 i; Wellington, 71 i.
- Coatit*, dimensions.....199 viii
- Coetlogon*, description, 600 iii; trials.....618 vi
- Coffin's averaging instrument.....679 v
- Coke, test of, on board *Dolphin*.....736 vi
- Colchester*, report on trial.....340 ii, 426 iv
- Colomb, Admiral.—Discussion of papers on water tight doors.....339 viii
- Colombia, U. S. of, gunboat for, description.....841 vii
- Colonia*, yacht, description.....998 v
- Columbia*, Channel steamer.....839 vi, 439 vii
- Columbia*, Act of Congress for, 409 ii; bids, 576 ii; damage by docking, report on, 569 vii; launch and particulars, 294, 513, iv; transatlantic run, 567 vii; trial, 1034 v, 1 vi.
- Columbia*, transatlantic liner, description, 168, 361 i; run.....368 i
- Columbia*, yacht, description and trial.....220 vi
- Comanche*, S. S., description.....207 viii

- Comanche*, yacht, description.....324 iv
- Combustion chambers, separate and common, 267 iii; combustion chambers and tube sheets for marine boilers with forced draft, 787 iv.
- Combustion, of coal, distribution of the total heat of, 548 iv; in marine boilers.—Fothergill, 764 viii; Orvis system of perfecting, 295 iii; Orsat tester on *Sicilia*, 583 viii.
- Comeur*.....603 iii
- Commerce on the Great Lakes.—Brock.....153 v
- Compound marine boilers.—Soliani.....477 viii  
engines, Ashlin's high pressure.....157 viii
- Compressed air for auxiliary machinery on board ship, 173 iv; machinery for lifting and hauling, 771 iv; motor, weight and power of, 582 vi; system of forced draft.—Kutz, 330 i.
- Conant, F. H.—Indicator tests.....322 iii
- Concord*, bursting of main steam pipe, 399 iii; condition of work on, 417 ii; law authorizing construction, 243 i; repairing a broken valve chest, 761 vi; trials, 578 ii, 89 iii.
- Condensation in and jacketing of cylinders of triple expansion engines, 486 iv
- Condenser tubes of U. S. S. *Baltimore*, deterioration of.....114 iv
- Conflict*, machinery details.....621 viii
- Connecting rod, graphic method of determining and counterbalancing the centrifugal action of the.....433 ii
- Connecting rods, method of considering obliquity in valve diagrams.....991 v
- Construction of warships, effect of battle of Yalu on.—Ferrand.....370 viii
- Contest*, description and trial.....424 vii
- Continuous current dynamo machines, on the designing of.....308 ii
- Contraction of area in tests of steel as a proof of quality.....764 iv
- Contracts for machinery of French naval vessels, forms of.....480 iv
- Cooper, Theodore, C. E.—Specifications.....559 v
- Copeland, Chas. W.—Obituary notice.....201 vii
- Copper boiler tubes nearest fire to be changed to steel in British destroyers, 424 vii; pipe flanges, standard dimensions, 421 iii; pipes, strength of brazed, 208 i; steam pipes, remarks on.—J. T. Milton, 522 vii; steam pipes, tests of wound.—W. Wachmann, 510 vii; steel, 504 iii; tempered, 407 iii.
- Coralia*, description and launch.....426 viii
- Corcovado*, description and trial.....865 viii
- Corliss boilers, test of.—Isherwood.....299 i
- Corrientes*, description, 383 viii; launch.....805 viii
- Corrosion, boiler, 689 iv, 673 vi; of steel boiler tubes, reasons for.—Gibbons, 413 vii; of steel vessels, 699 iv.
- Corrugated furnaces, Fox's, experiments on, and new formula for, 257 iv; partial collapse of one in Philadelphia, 131 vii.
- Corsaire*, description.....520 iv
- Coryell, M.—Discussion on tubulous boilers.....206, 371, 555 ii

- Cost, annual, of battleships during commission, 168 vi; of certain ships for French Navy, 521 iv; of English battleships, 495 vi; of power, increased, per unit at low power, 684 vi.
- County of York*, particulars.....79 i
- Cowles boiler, comparative test with Ward boiler.....414 ii
- Cowles, Wm.—Discussion on tubulous boilers, 204 ii; emergency power in ships of war, 215 i.
- Craig, G., combustion tester.....587 viii
- Cramp's floating derrick.....477 v
- Crane, large pillar.....193 v
- Cranes, locomotive.—Warren, 147 vi; cranes, modern.—Warren.....921 v
- Crank pin, repair of a broken.....456 iii
- Crank shafts.—McAlpine, 665 viii; fitting built-up, 9 iii; fitting up solid, 328 iii; steel forgings for, 1 iii.
- Creole*, description and launch.....857 viii
- Crescent*, coal consumption on long voyage, 415 vii; description, 134 iii, 746 v; trial, 747 v; voyage to Australia, 616 vi.
- Crête-a-Pierrot*, launch and description.....193 viii
- Cristobal Colon*, description and launch.....854 viii
- Crockett, C. W.—Amsler's polar planimeter.....665 v
- Croiseurs corsaires, France, description.....602, 825 vii
- Croll, D.—Working engines at low power.....592 vi
- Crompton.—Discussion of paper on dryness of steam.....320 vii
- Croneau, A.—Architecture navale.....844 vi
- Cruisers, British, Barrow built, 557 viii; fleet, 804 vi; new, 378 viii; Chinese, three new, 612 viii; French, recent trials of, 150 vii; German, triple screw, *M* and *N*, 631 viii; Italian, two new, 410 viii; Portuguese, new, 420, 851 viii; U. S., new, data of actual performance at sea, 637 iv; our new, their coal supply, 796 iv; *Torpedo*, Act of Congress for, 409 ii, description, 411 ii.
- Cup defenders.....650 v
- Curaçoa*, description.....204 viii
- Currents, wake, measurement of.....869 v
- Curry, description.....761 v
- Curves arising in engineering, analysis of.—Durand.....543 v
- Cushing*, description, 215 II; experiments investigated, 1 iv; launch and general description, 127 ii; particulars of machinery, follow 652 vi; trials of boilers, 580 ii, 683 vi; trials of machinery, 221 ii, 459 iii.
- Cylinder condensation, amount of in jacketed triple-expansion engines, 486 iv; moulding in dry sand, 159 iv; in loam, 376 iv; ratios in some British vessels, 566 viii.
- Cylindrical vs. water-tube boilers.....373 vi
- D'Allest boilers, 103 iv; description and management.—Robison, 365 vii; of *Bouvines*, test, 402 vii.
- Danube*, description.....634 vi

- Daphne*, trials.....86 i
- Daring*, boilers, 156 vi, 346, 363 vii; description, 204 vi, 713, 720 vii;  
description and trial, 605 vi; screw propeller experiments, 726 vii.
- D'Assas*, description, 204 vi; particulars and launch.....404 viii
- Davout*, description, 272 iii; trials.....600 iii, 314 iv
- Deadman, H. E.—Application of electricity in royal dockyards.....178 v
- Dean, F. W.—Duty trial of Blake pumping engine at Newton, Mass.....465 v
- Decoy*, trials.....804 vi
- Delta metal, process of manufacture of, 124, 493 iii; tests.....717 v
- Denig, R. G.—Contract trials of the *Machias* and *Castine*.....846 v
- Denny's method of wood carving.....837 vi
- Denny, A.—Speed trials of fast ships.....333 ii
- Denton, Jas. E.—The reliability of throttling calorimeters.....98 viii
- D'Entrecasteaux*, description, 751 v; launch and launching weight...626 viii
- Deoxidized bronze.....497 iii
- Deposits, boiler.....243 iii
- Depth of water, proper, for fast steamers.....603 iv
- Derrick, floating at Cramp's.....477 v
- Descartes*, description, 843 iv, 519 v; 805 vi; official trials.....626, 849 viii
- Designing of continuous current dynamo machines.....308 ii
- Desperate*, breakdown, 621 viii; description, 820 vii, 182 viii; launch, 399  
viii; trials, 842 viii.
- D'Estrées*, particulars.....190 viii
- Desulphurization of iron.....757 iv
- Detroit Boat Works, description of yacht building by.....446 vii
- Detroit*, 252, 351 i; 117, 293 iv; launch, 595 iii, 117 iv; trial.....500 v
- Devastation*, new machinery and trial.....1046 v
- Diadem*, description and launch, 828 viii; dimensions.....418, 814 vii
- Diana*, British, launch, 170 viii; official trials.....833 viii
- Diana*, Russian, notice.....638 viii
- D'Iberville*, description and trials, 806 vi; launch.....1063 v
- Dickie, G. W.—Discussion on speed trials of fast ships, 87 ii; discussion  
on air pumps, 547 vi.
- Dickinson screw propeller on *Herongate* and *Belle of Dunkerque*.....313 v
- Dido*, description and launch.....388 viii
- Dietrich, A.—Development in design and construction of German men-  
of-war, 543 viii.
- Dobson, Benjamin A.—Electric welding.....774 vi
- Dolphin*, law authorizing construction, 236 i; power required for air and  
circulating pumps, 135 vii; test of George's Creek coal on.—Baird, 329  
vii; test of coke on.—Baird, 736 vi.
- Dona Maria de Molina*, description and launch.....855 viii
- Donkin, Bryan.—Discussion of paper on dryness of steam.....317 vii
- Doris*, particulars and launch.....390 viii
- Double screw steel ferryboat *Bergen*, an account of the experiments made  
on the, 251 ii.

Signature	Book Repair rec'd 6/10/91	ret. 7-2-91	Call number (include divisional library) <i>negative</i>
<input type="checkbox"/> Mend pages <input type="checkbox"/> Tip in loose leaves <input type="checkbox"/> Tighten loose hinge <input type="checkbox"/> Stiffen cover	<input type="checkbox"/> Reattach case <input type="checkbox"/> Recase <input type="checkbox"/> Pocket/flapolio? <input type="checkbox"/> Wraparound		<i>VM</i>
If above instructions are not possible <input type="checkbox"/> Notify sender <input type="checkbox"/> Phone: <input type="checkbox"/> Perform appropriate treatment			<i>1 A 54</i>
Additional comments			<i>Subey</i> <i>V.1-8</i>

I. 19

.....474 iii  
 49 iii; compressed  
 8 v; Martin's sys-

.....424 vii  
 .....520 iv  
 .....92 iv  
 .....493 vi  
 .....833 iv, 614 vi

.....783 iv  
 .....159 iv  
 .....297 vii  
 .....188 viii  
 .....326 iv

.....636, 836 vi  
 .....221 vi  
 ew propeller.....321 v  
 .....290 iii

.....190 viii  
 .....655, 866 viii  
 tion and trials, 516,

study of the element  
 between equivalent  
 on Experiment Sta-  
 cker on propeller effi-  
 es for maxima and

minima by the use of ordinates, 71 iv.

Durston, A. J.—Discussion of papers on water tube boilers, 501, 515 viii;  
 engineering in British Navy, 779 vii; relation of heating surface to  
 I.H.P., 784 vii; the machinery of British warships, 332 vii; transmission  
 of heat through tube plates, 436 v.

Dynamo machines, on the designing of continuous current.....308 ii

East London Water Works, triple-expansion pumping engines.....215 vii

Eckart, W. R.—Discussion on speed trials of fast ships.....86 ii

*Eclair*, description.....127 iv

*Eclatante*, description .....173 vii

*Eclipse*, description, 604 vi; official trials.....615 viii

Economic marine propulsion .....219 iii

Economical speed, most, of naval vessels, 654 iv; economical voyages of  
 S. S. *Heighington*, 864 iv.

Economy of working at low power.....592 vi

*Edgar*, description and launch, 134 iii; description and trial.....122 iv

Edwards, J. R.—Discussion of paper on Experiment Station and Engi-  
 neer School, 481 vii; liquid fuel for naval purposes, 744 vii; relation of  
 the duties of naval engineer officers to the problem, 21 viii.

- Effect of size of ship upon speed, 818 v; form upon speed, 819 v; draught of water upon speed, 821 v.
- Efficiency, electrical.....557, 581 vi
- Eickenrad, F.—Use of electricity on board ships.....569 viii
- Ekaterinoslav*, particulars.....427 viii
- Elba*, description and trials.....831 vii
- Eleanor*, description .....220 vi
- Electra*, general data, 820 vii; launch .....621 viii
- Electric launches, 698 vi; light, cost of on *Albatross* compared with that of gas light, 516 vi; lighting.—Kennedy, 551 vi; lighting of ships, 510 iii, discussion, 517, 523 iii; lighting of S. S. *Tchihatchoff*, 183 v; lighting plant for ships, 802 iv; motors, efficiency, 557 vi, weight and power, 582 vi; pumping plant, 203 iv; traction.—Kennedy, 556 vi; transmission of power, 550 vi; traveling cranes, 921 v; welding, 774 vi.
- Electrical efficiency, 557, 581 vi; words, terms, and phrases, dictionary of.—Houston, 646 vi.
- Electricity, application in royal dockyards, 178 v; as motive power for auxiliary engines, 173 iv, 694 vi; on board ships, use of.—Eickenrad, 569 viii; one hundred years ago and to-day, 646 vi.
- Electrolytic process used by the Naval Construction and Armaments Co.....792 viii
- Elgar, Francis.—Comments on admiralty minute on loss of the *Victoria*, 112 vi; fast ocean steamships, 808 v.
- Elizabeth and Ellen Rickmers*, particulars and launch.....425 viii
- Ellida*, yacht.....645 vi
- Ellis, J. D.—Induced draft and hot air in boilers fitted with Serve tubes and retarders.....828 v
- Ellis & Eaves' suction draft .....744 vi, 142 viii
- El Norte*, description, 536 iv; indicator cards.....858 iv
- El Primero*, yacht, data and trials.....1090 v
- El Rio*.....858 iv
- Ely, George H.—The Great Lakes of North America.....140 v
- Emanuele Filiberto*, description .....196 viii
- Emery, C. E.—Discussion of paper on economical speed, 93 v; on speed trials of fast ships, 77 ii; on tubulous boilers, 382 ii.
- Emergency power in warships.—Cowles.....216 i
- Emperador Carlos V*.....360 i, 606 iii
- Emperor Nicholas I*, description, cost and weights.....424 ii
- Empress of China*, *Empress of India* and *Empress of Japan*, particulars, facing.....568 viii
- Empress of India*, H. M. S., hydraulic pipe system.....163 viii
- Endurance, coal, of our new cruisers.....796 iv
- Endymion*, description, 134 iii; trials.....745 v
- Engard.—Fitting up crankshafts of U. S. S. *Newark*, 9 iii; notes on modern boiler shop practice, 129 ii.

Engine, Ericsson compound and Belleville boiler, 345 ii; framing, weight per I.H.P. on some British vessels, 565 viii; marine, the.—Hollis, 712 iv; room signals, 197 iii, 743 iv, discussion, 440 iii; trials, notes on analysis of, by Alderdice, 510 ii, by Isherwood, 33 iii; triple expansion, advantages and disadvantages for war vessels, 718 iv.

Engineer divisions in naval militia, necessity of.—Fry, 303 viii; officers and the problem, lectures at War College.—Edwards, 21 viii; officers of U. S. Navy, new examinations for, 462 iv.

Engineering, Congress, International, 532 v, summary of papers, 637 v; in British Navy.—Durstun, 779 vii; London, editorial on torpedo boat destroyers, 796 vii; marine, some details in, 239 iii; research and training, necessity of.—Bieg, 449 vii.

Engineers in merchant service, examinations for in proposed rules of steamboat inspection service, 239 iv; proposed complements of, under steamboat inspection service rules, 233 iv; qualifications of, in proposed rules for steamboat inspection service, 236 iv.

Engines, calculation of horse power for marine.—English, 310 viii; number on *Indiana*, 662 vii; on *Maine*, 28 vii; on *Terrible*, 598 vii; quadruple expansion of S. S. *Gedeh*, 864 iv; vertical, reasons for general adoption of, 724 iv; weight of British naval.—Durstun, 348, 364 vii.

England, naval ship building programme, 145 vii; Navy estimates, 1896-'97, 376 viii.

English, Thos.—Calculation of horse power for marine propulsion, 310 viii; reply to discussion, 317 viii.

*Enquirer*, particulars.....434 viii

*Entre Rios*, description, 383 viii; trials.....804 viii

Entropy diagrams for steam and water.—Nulton.....285 viii

Ericsson compound engine and Belleville boiler.....445 ii

*Ericsson*, accident to machinery, 572 vii; launch, 421 vi; power trial, 793 vi

*Ernest Bazin*, description and launch.....870 viii

Ersatz *Leipzig*, description.....406 viii

*Esmeralda*, new, description and launch.....385 viii

*Espègle*, dimensions.....173 vii

*Espora* and *Rosales*, description and trials.....285 iii

*Etruria*, progressive trials.....198 viii

*Europa*, dimensions.....418, 814 vii

Evaporation, experiments in connection with.—Morison, 486 vii; influence of rate of combustion on, in boiler of *Cushing*, 683 vi.

Evaporators, data regarding performance, 503 ii; description and tests.

—Baird, 285 i; experiments.—Morison, 486 vii; explosion, 173 vi;

French naval regulation for sizes, 793 vii, 382 viii; new forms, 495 ii;

test.—Baird, 95 viii.

*E. W. Oglebay*, particulars and launch, 651 viii.

Examinations for engineer officers of U. S. Navy, 93 i; new, for engineer officers of U. S. Navy, 462 iv; proposed, for engineers in merchant service, 239 iv.



- Exchanges.....238 vi, 213 vii, 233 viii  
Expanding tubes by steam and electricity at the Yarrow Works.....589 viii  
Expansion engines, diameter of cylinders for successive.—Gow.....147 i  
Experiment Station and Engineer School.—Bieg.....449 vii  
Experimental apparatus for testing ships' models at Barrow, 788 viii; Thos.  
English's arrangement, 310 viii; experimental tank for Russia, 194 v.  
Experiments made on the double screw steel ferryboat *Bergen*.....251 ii  
Experiments with basic steel.....432 iv  
Explosion, boiler, on the *Sarrasin*, 166 vi; boiler on torpedo boat *Aquila*,  
605 vii; evaporator 173 vi; steam pipe on *Arêthuse*, 785 vi; on *Branden-*  
*burg*, 416 vi.  
Explosions of steam pipes, experiments to determine cause.—Wachsmann,  
737 vii; list of, on merchant steamers.—Milton, 535 vii.  
*Express*, 33-knot destroyer, builders.....622 viii  
  
Factors of safety for marine boilers and engines.—Key.....794 vii  
*Fairfax*, trial.....177 vii  
Failure of metal structures from fatigue.....1026 v  
*Falls of Inversnaid*, particulars.....80 i  
Fall River Line, new steamer for.....848 iv  
*Fame*, description, 182 viii; general data, 820 vii; launch.....400 viii  
Fan blower.....474 iii  
Fast ocean steamships.—Elgar.....808 v  
Fast time of Atlantic steamers.....494, 792 iv  
*Fauvette*, dimensions and speed.....440 vi  
*Favorite*, triple-screw steamer, dimensions.....438 vi  
Feed pipes, Weir's pressure regulator for.....815 viii  
Feed regulator, Belleville on *Wild Duck*, 94 vii; Reed's on *Porcupine*,  
398 viii; Thornycroft's, 790 vi; on *Speedy*, 421 vii; Yarrow & Co.'s,  
590, 792 viii.  
Feed-water, chemical measurement of.—Stromeyer, 517 viii; French  
naval regulation regarding lime in, 407 vii; modern methods of intro-  
ducing, 984 v.  
Feed-water heaters, 393 iv; Gilmour's, 578 v; Mudd's on *Inchmona*, 653  
viii; when use is advantageous, 158 i; Worthington's, 342 v; feed-water  
heating, Peck-Wheeler system, 196 v.  
*Feiseen*, description and trial.....763 v  
*Fei Ying*, trial and particulars.....811 vii, 162 viii  
Ferrand, L.—Effect of Yalu battle on warship construction.....370 viii  
*Ferret*, description and trial, 613 vi; training ship for engineer's force, 821 vii  
Ferrules, boiler tube, 449 v; in British Navy, 715 v; success of.....837 iv  
*Fieramosca*, trial.....236 ii  
Fire surfaces of boilers, overheating in the.....201 ii  
First-class battleships.—White.....464 vi  
Fish Commission steamer *Albatross*.....497 vi  
Fitts, James H.—Obituary notice.....1100 v

- Fitzgerald, Admiral.—Discussion of papers on water tight doors.....338 viii
- Flach, Emil.—Obituary notice.....1100 v
- Fleurus*, breakdown on trial, 173 vii; description, 520 v; new boilers put in, 626 viii.
- Flibustier*, particulars, 825 vii; preliminary trial.....430 vii
- Flora*, trial.....605 vi
- Fly wheels on air pumps.....527 vi
- Foam*, description, 182 viii; general data, 820 vii; launch.....844 viii
- Following wave.—Isherwood, 20 i; Mattice.....34 i
- Forban*, description and trials, 825 vii; dimensions.....429 vi
- Forbin*, particulars, 600 iii, 315 iv; trials.....180, 360 i
- Forced draft, comparison of compressed air and blower systems, 332 i; construction of boilers adapted to, 229 iii; Howden's system on *Chicora*, 865 iv; on *Harvey H. Brown*, 816 vi; on *Pomona*, trials, 436 vii; methods of applying, 155 i; systems compared.—Thom, 140 viii; tube sheets for boilers, with, 787 iv.
- Formosa*, description and trial.....441, 644 vi
- Formulæ for proportioning riveted joints.....403 iv
- Foros*, dimensions and speed.....440 vi
- Forsyth, Robert.—Care of marine boilers, 574 v; discussion of paper on air pumps, 538 vi; on economical speed, 104 v; on speed trials of fast ships, 89 ii.
- Forte*.....129 iii, 118 iv
- Foster Engineering Co., automatic safety stop valve on *Texas*.....592 viii
- Fothergill, J. R.—Marine boilers and efficiency of combustion and higher pressures.....764 viii
- Foudre*, French torpedo depot ship, description, 126 iv; description and launch, 76, 824 vii; to be changed to a cruiser, 403 viii.
- Fox*, dimensions and trial, 802 vi; particulars.....119 iv
- Frames, engine, of plate steel, for *Cruiser No. 11 (Marblehead)*.....90 iv
- Framing, engine, weight per I.H.P. on some British vessels.....565 viii
- France, naval regulations for sizes of evaporators, 793 vii; naval ship building programme, 146 vii; trials of new cruisers, notes, 150 vii.
- Frank Rockefeller*, description and launch.....425 viii
- Franz Josef I*, description and trial.....136 iii
- Free Lance*, description.....628 vii
- Freeman, E. R.—Discussion of paper on Experiment Station and Engineer School, 473 vii; trial of the *New York*, 613 v.
- Fremantle, Admiral.—Discussion of papers on water tight doors.....339 viii
- French Navy, manœuvres, 599 iii; new cruisers for, of *Dupuy de Lôme* type, 841 iv; new ships to be laid down in 1892, 311 iv; regulations for sizes of evaporators, changes in, 382 viii; ships to be commenced in 1893, 521 iv; tubulous boilers in.—Robison, 365 vii; vessels, conditions for contract trials, 481 iv.
- French ship building programme.....749 v

- Friant*, comparison of her Niclausse boilers with Belleville and D'Allest boilers, 408 vii; tests of Niclausse boilers, 375 viii; trials and alterations made, 429 vii; trials and description, 807 vi, 171 vii; weights of machinery, 409 vii.
- Friedrich der Grosse*, description.....861 viii
- Friesland*, description, 829 vii; particulars of boilers.....406, 792 viii
- Friesland*, steamer, particulars.....363 i
- Frithjof*.....605 iii
- Froude, R. E.—Discussion on arrangement of surface of screw propeller, 317 v; of paper on calculation of horse power, 316 viii.
- Fry, A. B.—Necessity of Engineer divisions in the Naval Militia.....303 viii
- Fuji Yama*, description, 632 vi; launch and particulars.....419 viii
- Furnace crowns, experiments with red hot, 223 iii; discussion on.—McKean, 431 iii.
- Furnace flues, corrugated, partial collapse of one in Philadelphia.....131 vii
- Furnaces, Farnley, 24 v; Fox, 27 v; Holmes, 24 v; Morison, 27 v; Purves, 24 v; tests, 38 v; Fox's corrugated, experiments on, and new formula for, 257 iv; marine boiler.—Morison, 11 v, discussion, 413 v; proposed rules for strength of, for steamboat inspection service, 223 iv.
- Furious*, dimensions.....419, 815 vii
- Furor*, launch.....856 viii
- Fürst Bismarck*, description and trial.....289, 610 iii
- Fusiyama*, report on trial of, 340 ii; trial data.....426 iv
- Gage, Howard.—Contract trial of the *Monterey*, 115 v; discussion on trial trips, 166 iii; examination of injection valve of *Launcester*, 88 i; experiment on evaporative efficiency of French briquettes, 578 vii.
- Galatea*, trials.....743 v
- Galilée*, description and launch.....405, 627 viii
- Galvanizing plant of Naval Construction and Armaments Co.....792 viii
- Gangut*.....606 iii
- Garibaldi*, description, 605 viii; trials.....803 viii
- Gas Engine and Power Co.'s naphtha yacht, description.....216 viii
- Gas engine for a screw scow.....415 vi
- Gauge glasses, Scholt and Gens'.....192 v
- Gaulois*, launch.....848 viii
- Gearing.—Discussion of papers on water tight doors.....342 viii
- Geddes.—Discussion on marine boiler furnaces.....418 v
- Gedeh*, quadruple expansion engines of.....864 iv
- Gehre's superheater, description and tests.....351 viii
- Geier*, description and trials.....192, 631 viii
- Geiser*, Thornycroft boilers.....237 ii, 163 v
- General Admiral Apraxine*, description, 839 vii; launch.....637 viii
- General Nerino*, description.....202 viii
- George N. Orr*, launch and particulars.....427 viii

- George Stephenson*, description and launch.....864 viii  
*George the Victorious*, description, 129 iv; description and trials, 635 viii;  
 launch, 420 viii.  
*George's Creek Cumberland coal*, test of, on the *Dolphin*.—Baird.....329 vii  
*Georgic*, description.....625 vii  
*Germanic*, new triple expansion machinery.....626 vii  
*German men-of-war*, development in design and construction.—Dietrich,  
 543 viii  
*German naval vessels*, experiments to determine cause of steam pipe ex-  
 plosions on.—Wachsmann.....737 vii  
*German Navy*, proposed strength of.....466 iii  
*Gibraltar*, description, 134 iii, 534 iv, 731 v; natural draft trial.....738 v  
*Gigantic*, White Star Line.....856 iv  
*Giralda*, description, 196 vii, 432 viii; speed on a race.....445 vii  
*Gladiator*, dimensions.....419 vii  
*Gleaner*, accident to, 305 iv; trial.....120 iv  
*Globe*, hull and machinery.....830 vi  
*Glory*, description.....378, 807 viii  
*Gloucester*, Merchants' and Miners' Co., 758 v; trial.....1086 v  
*Goliath*, description .....378, 807 viii  
*Goodall*, F. C.—Whaleback steamers.....453 iv  
*Gossamer*, trial.....598 iii  
*Göta*, description.....139 iii  
*Gothic*, White Star Line, launch.....757 v  
*Goubet submarine boat*, new.....158 viii  
*Governolo*, description.....620 vi  
*Gow*, J. L.—Discussion of paper on economical speed, 112 v; formulæ for  
 cylinder diameters of successive expansion engines, 147 i.  
*Grace Darling*, yacht, particulars.....77 i  
*Grafton*, coal consumption on long voyage, 415 vii; description, 134 iii,  
 504 v; trials, 744 v.  
*Grand Duchess*, launch and description.....205 viii  
*Graphic determination of crank effort*.—Canaga.....271 i  
*Graphic method of determining and counterbalancing the centrifugal*  
*action of the connecting rod*.—Canaga.....433 ii  
*Grasshopper*, description and trials.....261 i  
*Grease*, loss of efficiency due to deposit of.....782 vii  
*Great Eastern*, comparison with *Campania*, 810 v; dimensions 810 v;  
 speed, 815 v.  
*Great Western Railway Co.'s new steamers*, particulars.....868 viii  
*Greene*, A. S.—Obituary notice.....435 viii  
*Gremyastchy*.....605 iii  
*Griffin*, R. S.—Contract trial of *Bancroft*, 365 v; discussion on engine  
 room signals, 449 iii; on tubulous boilers, 206 iii; relative power of  
 ships at Samoa, 219 i.  
*Griffith Edwin*.—Comparison of the propellers of some U. S. Navy ships, 400 iv

- Gross, F.—Suction draft for boilers.....744 vi  
*Guardia Marina Riquelme*, launch.....611 viii  
*Guelph*, freight steamer, description.....832 vi  
*Guichen*, general data.....825 vii  
*Gunboat* for U. S. of Colombia, description.....841 vii  
*Gustave Zédé*, submarine boat, explosion on.....619 vi  
 Guy, A. E.—Graphic method of considering the obliquity of connecting  
   rods in valve diagrams.....991 v
- Haines, Hiram.—Coals of Alabama.....118 i  
*Hajen*, particulars.....612 viii  
*Halcyon*, torpedo gunboat, description.....833 iv  
*Halcyon* class, boilers of, 803 vi; trials.....614 vi  
 Hall, H.—Contract trial of the *Indiana*.....637 vii  
 Hall, R. T.—Manufacture of open hearth steel castings, 185 i; the manu-  
   facture and inspection of iron and steel boiler tubes, 301 ii.  
 Halpin, Dewitt.—Discussion of paper on dryness of steam.....318 vii  
*Handy*, description of machinery and trial data.....426 vii, 393 viii  
*Hannibal*, dimensions, 423 vi; launch.....613 viii  
 Harbor defense ram.....295 iv  
*Hardy*, official trials.....620 viii  
 Harlan & Hollingsworth Co.—Merchants' & Miners' Co.'s steamer...176 vii  
*Harrier*, description, 833 iv, 426 vi; trials.....803 vi  
*Hart*, description and trials, 393 viii; dimensions, 426 vii; trials.....180 viii  
*Hartford*, air pump.....525 vi  
 Harvey process of surface-hardening steel.....591 iii, 512 iv  
*Harvey H. Brown*, description and test.....816 vi  
*Hashidate*.....316 iv  
 Haswell, C. H.—Discussion of paper on Experiment Station and En-  
   gineer School, 458 vii; on air pumps, 535 vi.  
*Haughty*, dimensions and launch, 823 vii; trials.....180, 397 viii  
*Havel*, description.....288 iii  
*Havock*, description, 655 v, 203 vi; trials.....1056 v, 426 vii  
*Hawke*, description.....134 iii  
 Hayes, C. H.—Partial collapse of a corrugated furnace flue, 131 vii; con-  
   tract trial of U. S. S. *Massachusetts*, 237 viii.  
*Hazard*, torpedo gunboat, description, 833 iv; trial.....426 vi  
 Head, Jeremiah.—Discussion of paper on dryness of steam.....323 vii  
 Heat, loss of by smoke.....802 iv  
 Heating surface and I.H.P., ratio of, used in British Navy.—Durstun...784 vii  
 Heaton, W. W.—Obituary notice.....636 vii  
*Hebe*, description.....533 iv  
*Heighington*, economical voyages.....864 iv  
*Heimdal*, description.....800 vi  
*Helena*, bids, 1037 v; description, 727 v, 176 vi; launch.....160 viii  
*Henri IV*, description, 427 vi; particulars.....187 viii

- Herbert, W. C.—Contract trial of U. S. S. *Brooklyn*.....741 viii  
*Hercules*, speed and power, 493 vi; trial of new machinery.....220 v  
*Hermione*, evaporative tests of two boilers, 151 vii; service trials.....815 vii  
*Hero*, description and trial.....619 vii  
*Hiawatha*, description.....214 viii  
Hick, Hargreaves & Co.'s superheater, description and tests.....352 viii  
*Hildebrand*, launch.....847 iv  
Hill, Warren E.—Welded steel steam pipes.....731 vi  
Hine, R. B.—Contract trial of U. S. S. *Concord*.....89 iii  
Hine, R. B.—Obituary notice.....635 vii  
*Hoche*, alterations made, 428 vii; trial and description.....269, 602 iii  
*Hohenzollern*, description and trials.....431 vii  
*Holland*, boilers, 406 viii; description, 829 vii; Yarrow boilers.....792 viii  
Hollis, Ira N.—Coal endurance and machinery of the new U. S. cruisers, 637 iv; discussion on air pumps, 541 vi; on paper on Experiment Station and Engineer School, 481 vii; economical speed and coal endurance, 66 v; Marshall valve gear, 1 ii; steel castings, 193 i; chase of the *Itata*, 360 iv; test of boilers of yacht *Wild Duck*, 79 vii.  
Hollow and solid shafts, curves showing relation between equivalent.—Durand .....507 vii  
*Hornet*, description, 655 v; description and trial, 424 vi; steel to replace copper tubes, 426 vii; test of boiler, 163 vi; trials, 426, 733 vii; Yarrow boilers of, 391 vi.  
Horse power, calculation of, for marine propulsion.—English.....310 viii  
Housings, engine, of plate steel, for *Cruiser No. 11*.....90 iv  
How to accurately measure the speeds of large fast vessels during several consecutive hours.....93 ii  
Howden, Jas.—Comparative merits of cylindrical and water tube boilers for ocean steamships, 373 vi; discussion of paper on transmission of heat through tube plates, 462 v.  
Howden's forced draft.—Thom.....141 viii  
on *Carinthia* and *Sylvania*, 843 vii; *Chicora*, 865 iv; *Harvey H. Brown*, 816 vi; *Piet Hein*, 194 viii; *Pomona*, 436 vii.  
*Howe*, coal endurance, 133 iii; speed and power.....491 vi  
Howell's steam vessels and marine engines.—Review.....217 viii  
*Hudson*, trial .....703 v  
Hunt, A. M.—Inspection and manufacture of steel plates, 128 i; steel crank shaft forgings, 1 iii.  
*Hunter*, description of machinery and trials, 393 viii; launch.....180 viii  
*Huntress*, description.....630 vii  
*Hussar*, torpedo gunboat, description.....833 iv  
Hydraulic machinery of *Massachusetts*, 261 viii; *Oregon*, 467 viii; *Texas*, 85 viii; pipes, to prevent freezing of, on *Empress of India*, 163 viii; press vs. steam hammer, 715 v; pumps of *Maine*, vii; transmission of power to auxiliaries on board ship, 173 iv.

- Ice machine, dense-air, the Allen, 771 iv; of *Massachusetts*, 259 viii; *Minneapolis*, trial, 725 vi; *Oregon*, 465 viii.
- Ignazio Florio*, description, 209 viii; trials.....869 viii
- Illawara*, description.....215 viii
- Illinois*, bids, contract and description, 797 viii; proposals.....596 viii
- Illinois*, S. S., description and indicator cards.....470 iii
- Illustrious*, dimensions, 423 vi; launch.....810 viii
- Impetueuse*, description.....173 vii
- Inchmona*, description and launch, 422 viii; trials.....652 viii
- Indefatigable*, description, 265 iii; trial.....120 iv
- Independencia*, description.....229 v, 809 vi
- India*, particulars and launch.....421 viii
- Indiana*, 292 iv; Act of Congress for and description, 409 ii; changes in and bids, 575 ii; description and launch, 492 v; trials, 421 vi, 637 vii.
- Indiana*, S. S., weight and particulars of boiler.....395 vi
- Indicated horse power and heating surface, ratio of, used in British Navy.—Durstun.....784 vii
- Indicator testing apparatus at New York Navy Yard, 322 iii; tests.....322 iii
- Indicators, comparison of Thompson, Tabor and Crosby, 1025 v; defects in (see Trial trips, &c.), 436 iii.
- Induced draft.—Durstun, 786 vii; experiments, 828 v; Martin's system of, 567 ii; on *Magnificent*, trial of, 812 vii.
- Inertia stresses of a slide valve.—Macalpine.....272 vi
- Infanta Maria Teresa*, description, 360 i, 138 iii, 621 vi; trials.....960 v
- Infernet*, particulars.....190 viii
- Insolente*, description.....173 vii
- Inspectors of machinery afloat in the British Navy.....113 iv
- Instructions for determining coal consumption in French Navy.....406 ii
- International Engineering Congress, 532 v; summary of papers.....637 v
- International S. S. Co.....235 v
- Iolaire*, description.....213 viii
- Iona*, comparison of machinery and performance with *Baltimore*, 685 vi, 53 vii; trials, 374 iii, 426 iv.
- Iowa*, bids for, 201 v; description, 811 iv; launch, 383 viii; particulars, 811 iv
- Iron, elimination of sulphur from, 757 iv; slow combustion of.—McKean, 364 i; steam pipes, remarks on.—Milton, 522 vii.
- Iroquois*, test of Klotz's forced draft system on launch of.....334 i
- Iroquois*, S. S., description and trial, 146 iii; review and experimental test of steam plant, 445 vi.
- Isherwood, B. F.—*Albatross*, 497 vi; an account of the experiments made on the double screw steel ferry boat *Bergen*, 251 ii; an investigation of Assistant Engineer W. H. Alderdice's "Notes on Analysis of Engine Trials," 33 iii; an investigation of the mode of action of ship-formed solids on the water in which they move, determining the cause of squatting and increased resistance in shoal water, 329 iv; digest of experiments on a triple expansion pumping engine, 215 vii; digest of

Isherwood, B. F.

Prof. Peabody's test of pumping engine, Newton, Mass., 769 v; discussion of paper on economical speed, 83 v; on Experiment Station and Engineer School, 454 vii; on tubulous boilers, 180 ii; Ericsson compound engine and Belleville boiler, 445 ii; experimental comparison of a single cylinder engine with a triple expansion engine, 271 v; how to accurately measure the speeds of large vessels during several consecutive hours, 93 ii; Orvis system of perfecting combustion, 295 iii; phenomena attending ship propulsion, 97 i; progressive trials of Commandant's barge, New York Yard, 1 i; test of Corliss boilers, 299 i; test of the Worthington pumping engine built for the city of New Bedford, Mass., 26 ii; the steam yacht *Yosemite*, 668 vii; the U. S. torpedo boat *Cushing* and its experiments investigated, 1 iv.

*Isis*, launch.....618 viii

*Isly*.....603 iii

Italy, new cruisers, particulars, 410 viii; fast torpedo boats for, built by Schichau, 845 iv.

*Itata*, the chase of the.....360 iv

*Itsukushima*, description, 316 iv; description and trial.....145 iii

Jacobus, D. S.—Measurement of temperatures of steam, 115 viii; tests of throttling calorimeters, 140 vii.

Jackets, steam, efficiency of, in triple-expansion engines.....486 iv

Jameison, Andrew J.—On designing of continuous current dynamo machines.....308 ii

*Jamestown*, description.....430 vi

*James Watt*, description and launch .....865 viii

*Janus*, description, 425 vii; description and trials.....835 viii

*Jaseur*, torpedo gunboat, description.....833 iv

*Jason*, description, 532 iv; description and trial.....226 v

*Jauréguiberry*, description, 279, 603 iii, 616 vi; launch and description, 1064 v; official trials and accident to boiler, 624 viii.

*Jean-Bart*.....314 iv

*Jeanne d'Arc*, triple-screw cruiser, particulars .....188 viii

*Jemnapes*, description, 235 ii; trials.....805 vi, 402 vii

*John Englis*, description and launch, 872 viii; particulars.....430 viii

*John Ericsson*, particulars and launch.....651 viii

Joints, riveted, formulæ for proportioning, 403 iv; test of, at Watertown Arsenal, 624 iv.

*Josephine*, description, 211 viii; launch and engine details.....431 viii

Joy.—Pipe boilers in the United States.....462 v

*Jubilee*, yacht, description.....998 v

*Juno*, launch and description.....169 viii

*Jupiter*, launch and particulars.....163 viii

*Jurien-de-la-Gravière*, notice, 825 vii; particulars.....190 viii



- Kabyle*, description.....127 iv  
 Kafer, J. C.—Discussion on compressed air system of forced draft.....332 i  
*Kaiser Friedrich*.....208, 646, 861 viii  
*Kaiser Friedrich III* (Ersatz *Preussen*), 827 vii; launch.....627 viii  
*Kaiser Wilhelm der Grosse*, description.....860 viii  
*Kaiserin Augusta*, triple-screw ship, description, 126 iv; trials, 846 iv, 627, 782 viii.  
*Kaiserin Elizabeth*, description and launch.....584 ii  
*Kaiserin und Königin Maria Theresia*, description and trials.....153 vii  
*Kanawha*, particulars.....433 viii  
*Kasarski*, performance, 282 iii; trial, 426 ii; weight of machinery.....171 v  
*Katahdin*, launch, 202 v; trial.....804 vii, i viii  
 Kearney, G. H.—Breakdown of air pump gear, 248 i; moulding a cylinder in loam, 376 iv; running lines for shafting of *Cincinnati*, i v.  
*Kearsarge*, bids and contract, 160 viii; description.....581, 801 vii  
 Keels, bilge, advantage of.....824 v  
 Kendall, Edward & Sons.—Tests of their riveted joints.....727 viii  
 Kennedy, A. B. W.—Discussion on arrangement of surface of screw propeller, 322 v; electric transmission and electric lighting, 550 vi; marine engine trials, 374 iii; report on trial of steamers *Fusiyama*, *Colchester* and *Tartar*, 340 ii; trial of S. S. *Ville de Douvres*, 409 iv.  
*Kensington*, description of hull and machinery, 217, 823 vi; particulars of boilers, with suction draft, 746 vi; trial, 830 vi.  
*Kentucky*, bids and contract, 160 viii; description.....581, 801 vii  
*Kersaint*, particulars.....191 viii  
 Key, J.—Factors of safety for marine boilers and engines.....794 vii  
*Kheron*, boiler installation compared with *Renown's* and *St. Petersburg's*, 641, 642 viii; boiler tests, 791 vii; description, 618 vii; description and trials, 639 viii; launch, 852 vii.  
*Khrabry*, launch and dimensions .....200 viii  
*Kiev*, launch and particulars.....644 viii  
 King, C. A. E.—Discussion on trial trips.....167 iii  
 King, H. D.—Steam plant of *Iroquois*.....446 vi  
 Kingston and Holyhead Mail Service, four steamers for, description...623 vii  
 Kinkaid, T. W.—Contract trial of *Texas*, 82 viii; discussion of paper on economical speed, 105 v; on Experiment Station and Engineer School, 467 vii; on progressive trials of Commandant's barge, 40 i; feed-water heating, 393 iv.  
 Kirkaldy's evaporator.....491 vii  
 Klotz system of forced draft.....330 i  
*Knight Bachelor*, freight steamer.....839 vi  
*Königin Luise*, description and launch.....861 viii  
*Komet*, dimensions and trial.....828 vii  
 Kreuzpointner, P.—Bending tests and contraction of area as proofs of quality.....764 iv  
*Kronprinz Fr. Wilhelm*, particulars .....78 i

- Kurfuerst Friedrich Wilhelm*, description.....465 iii  
 Kutz, Geo. F.—A compressed air system of forced draft, 330 i; reply to discussion, 334 i.
- La Belle Sauvage*, description, 842 vi; trial.....199 vii  
*La Gascogne*, accident to engines .....139 vii  
 Lagrafel-d'Allest boilers, description and management of.—Robison, 365 vii; of *Bouvines*, test, 402 vii.  
*La Hire*, particulars.....190 viii  
 Lakes, Great, of North America, 140 v; commerce on.....153 v  
 Lake steamers, building by the Cleveland S. B. Co., dimensions, 178 vii; cargo, *Victory* and *Zenith City*, description, 177 vii.  
*Lalande*.....600 iii  
*La Marguerite*, description.....636 vi  
 Lambert, Prof.—Discussion of papers on water tube boilers.....511 viii  
*La Navarre*, description .....218 vi  
*Lancaster*, examination of injection valve.....88 i  
 Langton.—Discussion of paper on transmission of heat through tube plates.....458 v  
*Languedoc*, Ashlin's high pressure compound engines .....157 viii  
*Lansquenet*, description, 1063 v, 206 vi; trials, 807 vi; trials and break-down, 430 vii.  
*Lapwing*, description and trial.....260 i  
 Largest cargo steamer in the world, *Samoa*.....867 iv  
*Latona*, 596 iii; description and launch, 420 ii; trial.....266 iii  
*Latouche-Treville*, cost and weights, 422 ii; description, 236 ii, 841 iv; trials and dimensions, 172, 429 vii.  
*La Touraine*, description, 362 i, 432 ii, 611 iii; dimensions, 162 vi; indicator diagrams, 134 iv.  
 Laws of similitude in reference to naval construction.—Normand.....284 vii  
*L. C. Waldo*, description and launch, 423 viii; trials.....858 viii  
*Leda*, description, 832 iv, 510 v; trials.....1060 v  
*Léger*.....603 iii  
*Leipzig* (Ersatz), particulars.....827 vii  
 Leonard, S. H.—Discussion on trial trips, 175 iii; dressing up crankshaft pillow blocks, 174 i; failure of a cast steel piston on *Charleston*, 789 vii; moulding a cylinder in dry sand at Bath Iron Works, 159 iv; preservation of marine boilers, 179 iii; tubulous boilers, 163 iii; reply to discussion on, 211, 401 ii.  
 Leopold, H. G.—Circulating pumps, 295 v; note on the development of cylindrical heads for steam boilers, 221 iii; theory of the centrifugal pump, 335, 483 iii.  
*Lévrier*, trial.....845 iv  
*Libertad*, description and trial.....229 v  
*Lieutenant Kasarsky*, see *Kasarsky*.  
 Lifting and hauling appliances in Portsmouth dockyard.....771 iv

- Lighting-plant, ship.....802 iv  
*Lightning*, description, 425 vii, 835 viii; official trial and collision.....172 viii  
*Liguria*, progressive trials, 199 viii; trial and machinery.....1075 v  
 Lime in feed water, French naval regulation.....407 vii  
 Lincoln, J. M.—Comparison of typical ocean steamers, 162 vi; trial data of steamships, 590 vi.  
*Linois*, description.....842 iv  
 Liquid fuel, at sea, 417 vi; in combination with coal, 415 vi; on board ship, 679 vi; on torpedo boat *Sunderland*, 244 ii; for naval purposes.—Edwards, 744 vii; McFarland, 68 vii.  
 Loam, moulding a cylinder in.....376 iv  
 Lockhart, Wm. S.—Discussion of paper on dryness of steam.....322 vii  
 Log, patent, is it maligned?.....227 ii  
*Lombardia*, progressive trials.....198 viii  
*Longmoon*, particulars and trial.....655 viii  
 Longridge, M.—Discussion of paper on dryness of steam, 316 vii; experiments on triple-expansion pumping engine, 215 vii.  
 Loring, C. H.—Discussion of paper on Experiment Station and Engineer School, 462 vii; on tubulous boilers, 194, 394 ii.  
*Lorraine*, general dimensions.....196 vii  
*Louisiana*, new machinery.....820 vi  
 Lowe, John.—Discussion on engine-room signals, 440 iii; on economic marine propulsion, 219 iii.  
 Lubrication, the rationale of marine engine.....571 iii  
*Lucania*, 856 iv; bunker capacity, 1069 v; voyages, 1020, 1021, 1069 v, 438, 790 vi.  
*Lynx*, accident to, 170 vii; trials .....614, 805 vi, 821 vii  
 Macalpine, John H.—On crank shafts, 665 viii; on the inertia stresses of a slide valve, 272 vi.  
*Machias*, 351 i, 117, 294 iv; bids, 206 ii; changes, 176 vi; trial.....720, 846 v  
 Machinery, in action, casualties and management of.—McFarland, 57 vii; of British warships.—Durston, 332 vii; of the *Cushing*.—Potts, 215 ii.  
*Magicienne*, description and trials.....178, 255 i  
*Magnet*, description and trials.....805 viii  
*Magnificent*, description, 1038 v; launch, 161 vii; trials.....811 vii  
 Main, H.—Discussion on engine-room signals, 450 iii; on lessons from Samoa, 212 i.  
*Maine*, 411 ii, 291 iv; description, 175 i; launch, 577 ii; law authorizing construction, 239 i; trials, 719 v, 792 vi, 1 vii; third-class torpedo boats for, 729 v, 526 vi, 24 vii.  
*Maine*, Sound steamer, description.....323 iv  
*Majestic*, description, 1038 v; launch and weights, 167 vii; trials, 812 vii, 811 viii.  
*Majestic*, S. S., description, 167, 360 i, 99 iv; indicator cards.....288 iii  
*Mallard*, data, 820 vii; description.....182 vii

- Manganese bronze, 491 iii; manganese steel.....505 iii
- Mangini*, dimensions.....148 vii
- Manning, C. H.—Discussion on tubulous boilers, 194 ii; of paper on Experiment Station and Engineer School, 457 vii.
- Manola*, Minn. S. S. Co., dimensions and statement of operations.....151 v
- Manœuvres, British naval, 1888, 169 i; 1889, 264 i; 1892.....786, 837 iv
- Marathon*, trials.....254 i
- Marblehead*, 253, 351 i, 294, 516 iv; trial.....129 vi
- Marceau*, description and trial.....273 iii
- Marco Polo*, description and trials.....633 viii
- Margarita*, description and launch, 213, 660 viii; dimensions, 441 vi; trials, 873 viii.
- Marie Henriette*, description, 431 vi; trial.....1086 v
- Marie Rickmers*, particulars.....425 viii
- Marietta*, 799 viii; bids and contract, 804 vii; description.....583 vii
- Marine boiler construction.—Stromeyer, 890 v; boilers, 327 v; boilers.—Fothergill, 764 viii; economics.—McFarland, 681 vi; engine, the.—Hollis, 711 iv; engine, the modern, &c.—McFarland, 647 vi; engine trials, 374 iii; machinery, table showing progress in, follows 652 vi; propulsion, calculation of horse power for.—English, 310 viii.
- Mars*, description and launch.....386 viii
- Marshall valve gear.—Hollis, 1 ii; memoranda regarding invention of, 248 ii
- Martell, B.—Discussion of papers on water tight doors.....340 viii
- Martin's system of induced draft.....567 ii
- Massachusetts*, 292 iv; Act of Congress for and description, 409 ii; changes in and bids for, 575 ii; launch, 721 v; trials, 602 vi, 238 viii.
- Massena*, triple-screw battle ship, description, 315 iv; description and launch, 603 vii.
- Matsushima*.....316 iv
- Mattice, A. M.—Arrangement of machinery for full power and for cruising, 100 v; discussion of paper on economical speed, 95 v; on progressive trials of steam barge (following wave and squatting), 33 i; on some lessons from Samoa (manganese bronze screws and smokepipes), 220 i; on speed trials of fast ships, 81 ii; on trial trips, 161 iii; on tubulous boilers, 396 ii; phenomena attending ship propulsion, 223 i.
- Mayflower*, new steamer of Fall River Line.....848 iv
- McAllaster, E. L.—Performance of S. S. *City of Alpena*.....973 v
- McAllister, C. A.—New revenue cutters, 561 vii; trial of the *Hudson*, 703 v
- McFarland, W. M.—Data regarding performance of evaporators, 503 ii; discussion of paper on air pumps, 536 vi; on Experiment Station and Engineer School, 479 vii; effect of foul bottom on speed, 73 i; speed trials of fast ships, 68 ii; reply to discussion on, 91 ii; the proposed revision of the rules of the steamboat inspection service, 210 iv; trial of the *Baltimore*, 337 i; of the *Yorktown*, 137 i; trial trips and the lessons to be learned from them, 149 iii; War College lectures, 647 vi, 33 vii.

- McKean, F. G.—Discussion on air pumps, 534 vi; on engine room signals, 443 iii; on red hot furnace crowns, 431 iii; is the patent log maligned, 227 ii; slow combustion of iron, 364 i; some lessons from Samoa, 209 i.
- McPhail and Simpson's superheater, description and tests.....353 viii
- Mechanical equivalent of heat.—Spangler.....39 i
- Medea*, description and trials.....87 i
- Medusa*, change of screws, 255 i; trials.....178 i
- Medusa* class, cost of and notes on foul bottom.....420 ii
- Melampus*, 596 ii; trial.....460 iii
- Mellen, C. J.—Change valve for hydraulic turret turning engines of Texas, 85 viii.
- Melpomene*, description and trials.....255 i
- Members.....147 iv, 259 v, 229 vi, 203 vii, 223 viii
- Merchant Steamers.—*Aberdeen*, 444 vii; *Aco*, 441 vii; *Adria*, description and launch, 648 viii; trial, 868 viii; *Alabama*, 858 iv; *Alaska*, 162 vi; *Alberta*, 860 iv; *Alexander Holly*, 864 viii; *Alfonso XIII*, 168 i; *Algoa*, 428 viii; *Alleghany*, 193 vii; *Aller*, 162 vi; *Alma*, 191 vii; *Almy*, 131 iv; *Alsace*, 196 vii; *America*, petroleum tank steamer, 867 iv, 162 vi; *Andalusia*, 867 viii; *Arequipa*, 363 i; *Arizona*, 162 vi; *Armenia*, 648 viii; *Asturia*, 649 viii; *Atlanta*, 421 viii; *Augusta Victoria*, description, 162 vi, 862 viii; run, 269 i; *Aurania*, 162 vi; *Australia*, 863 iv; *Australien*, 372 vii.
- Baku Standard*, 417 vi; *Banshee*, 840 vi; *Barbarossa*, 861 viii; *Bayern*, 1077 v; *Belle of Dunkerque*, 313 v; *Bergen*, 251 ii; *Bremen*, 861 viii; *Britannic*, 162 vi; *Bromo*, 78 i; *Buenos Aires*, 78 i.
- Caledonia*, 643 vi, 192 vii; *Campania*, description, 852 iv, 247, 385 v, 162 vi; trials, 405 v; voyages, 409, 754 v, 438, 790 vi; *Cape Ann*, 624 vii; *Carinthia*, 843 vii; *Carlow*, 656 viii; *Cevic*, 1076 v; *Chesapeake*, description, 624 vii; trial, 853 vii; *Chicora*, 865 iv; *China*, 422 viii; *Christopher Columbus*, 240 v; *City of Alpena*, 973 v; *City of Bangor*, 424 viii; *City of Berlin*, 162 vi; *City of Buffalo*, 428 viii; *City of Lowell*, description, 1088 v; trial, 633 vi; *City of New York* and *City of Paris* (see *New York* and *Paris*), Act authorizing an American register, 320 iv; *City of Rome*, 162 vi; *City of Venice*, 79 i; *Colchester*, 340 ii, 426 iv; *Columbia*, Channel steamer, 839 vi, 191, 439 vii; *Columbia*, transatlantic steamer, 168, 361 i, 162, 306 vi; *Comanche*, S. S., 207 viii; *Comanche*, yacht, 324 iv; *Coralia*, 426 viii; *Corcovado*, 865 viii; *County of York*, 79 i; *Creole*, 857 viii; *Curaçoa*, 204 viii; *Curry*, 76 iv.
- Danube*, 634 vi; *Duke of Clarence*, 326 iv; *Duke of York*, 636, 836 vi; *Dunottar Castle*, 290 iii; *Dunvegan Castle*, 655, 866 viii.
- Eider*, 162 vi; *Ekaterinoslav*, 427 viii; *Elbe*, 162 vi; *El Norte*, description, 536 iv; indicator cards, 858 iv; *El Rio*, 858 iv; *Empress of China*, *India* and *Japan*, 363 i, facing 568 viii; *Empress of India*,

## Merchant Steamers.

- 162 vi; *Ems*, 162 vi; *Ernest Bazin*, 870 viii; *E. W. Oglebay*, 651 viii; Express passenger steamers for the Lakes, 238 v.
- Fairfax*, 177 vii; *Falls of Inversnaid*, 80 i; *Favorite*, triple-screw steamer, 438 vi; *Frank Rockefeller*, 425 viii; *Friedrich der Grosse*, 861 viii; *Friesland*, 363 i; *Fürst Bismarck*, description, 162 vi; trial, 289, 610 iii; *Furnessia*, 162 vi; *Fusi Yama*, 340 ii, 426 vi.
- Gallia*, 162 vi; *Gedeh*, 864 iv; *George N. Orr*, 427 viii; *George Stephenson*, 864 viii; *Georgic*, 625 vii; *Germanic*, 626 vii; *Gigantic*, 856 iv; *Globe*, 830 vi; *Gloucester*, description, 758 v; trial, 1086 v; *Gothic*, 737 v; *Grand Duchess*, 205 viii; *Great Eastern*, 162 vi; Great Western Railway Co.'s, 868 viii; *Guelph*, 832 vi.
- Harvey H. Brown*, 816 vi; *Havel*, 288 iii; *Heighington*, voyages, 864 iv; *Hero*, 619 vii; *Herongate*, 313 v; *Himalaya*, 410 vi.
- Ignazio Florio*, description, 209 viii; trials, 869 viii; *Illinois*, 470 iii; *Inchmona*, description, 422 viii; trials, 652 viii; *India*, 421 viii; International Co.'s new steamers, 522 v; *Iona*, comparison with *Baltimore*, 685 vi; trials, 374 iii, 426 iv; *Iroquois*, 445 vi; *Isle of Arran*, 525 v; *Itala*, chase of, 360 iv.
- Jamestown*, 430 vi; *James Watt*, 865 viii; *Jelunga*, 78 i; *John Englis*, 430, 872 viii; *John Ericsson*, 651 viii.
- Kaiser Friedrich*, 861 viii; *Kaiser Wilhelm der Grosse*, 860 viii; *Kaiser Wilhelm II*, 162 vi; *Kensington*, description, 217, 746, 823 vi; trial, 830 vi; *Kherson*, description, 618, 791, 852 vii; trials, 639 viii; *Kiev*, 644 viii; Kingston and Holyhead Mail Service, four steamers, 623 vii; *Knight Bachelor*, 839 vi; *Königin Luise*, 861 viii.
- La Bourgogne*, 162 vi; *La Gascogne*, 139 vii; *Lahn*, 162 vi; Lake cargo steamers *Victory* and *Zenith City*, 177 vii; Lake steamers building by Cleveland S. B. Co., 178 vii; *La Marguerite*, 636 vi; *La Navarre*, 218 vi; *Languedoc*, 157 viii; *La Normandie*, 162 vi; *La Touraine*, description, 362 i, 432 ii, 611 iii, 162 vi; indicator diagrams, 134 iv; *L. C. Waldo*, description, 423 viii; trials, 858 viii; *Liguria*, 1075 v; *Longmoon*, 655 viii; *Lorraine*, 196 vii; *Louisiana*, 820 vi; *Lucania*, 856 iv, 1069 v; voyages, 1069 v, 438, 790 vi.
- Maine*, 323 iv; *Majestic*, 167, 360 i; indicator cards, 288 iii; *Manitou*, 524 v; *Manola*, 151 v; *Marie Henriette*, description, 431 vi; trial, 1086 v; Merchants' and Miners' Co., new steamer, 176 vii; *Mercury*, 640 vi; *Meteor*, 227 i, 426 iv; *Minneburg*, 428 viii; *Miowera*, 643 vi; *Mohegan*, 422 viii; *Mohawk*, paddle wheel steamer, 422 viii; *Mohawk*, S. S., 760 v; *Moor*, 633 vi.
- Neptune*, 640 vi; New Cunarders, 324 iv; *New Hampshire*, 323 iv; *New York*, 166 i; voyage, 701 vi; *Nile*, 1069 v; *Norman*, description, 834 vi; trial, 178 vii; *Normannia*, description, 162, 306 vi; trial, 237 ii; voyages, 218 vi; North German Lloyd, new steamers, 852 vii, 207, 646, 861 viii; *Northland*, 178 vii; *Northwest*, description, 212 vi; trial, 430 vi.

## Merchant Steamers.

- Ohio*, 619 vii; *Ophir*, 135 iv, 162 vi; *Oregon*, 162 vi; *Orient*, 162 vi; *Ornuuz*, 162 vi; *Oroya*, 162 vi.
- Paris*, description, 167, 170 i, 238, 429 ii, 467 iii, 99 iv, 162, 290, 306 vi; voyages, 494, 792 iv, 755 v; *Pectan*, 853 vii; *Pembroke Castle*, 162 vi; *Pennsylvania*, description, 851 vii, 862 viii; *Peru*, 233 v; *Petersburg*, 633 vi; *Pilgrim*, 849 iv; *Pioneer*, 245 v; *Plymouth*, 587 ii, 849 iv; *Polynesian*, 290 iii; *Pomona*, 436 vii; *Prinses Marie*, 840 vi; *Prinz Heinrich*, 839 vi, 437 vii; *Prinz Regent Luitpold*, 437 vii; *Priscilla*, 848 iv, 436 vi; *Puri*, 644 viii; *Puritan*, 849 iv.
- Queen City*, 652 viii; *Queen Olga* .....596 vi
- Ramapo*, 868 viii; Red D Line, 436 vii; *Reina de los Angeles*, description, 427 viii; trials, 652 viii; *Reina Maria Cristina*, 168 i; *Richard Peck*, 857 iv; *Rickmers, Elizabeth, Ellen and Marie*, 425 viii; *Robert Fulton*, 864 viii; *Roland*, 1077 v; *Rotterdam*, 208 viii.
- Samoa*, 867 iv; *Santiago*, 363 i; *Scot*, 162 vi; *Scotia*, 162 vi; *Scottish Hero*, 852 vii; *Seaford*, 838 vi; *Seguranca*, 429 ii; *Seine*, 635 vi; *Senator*, 652 viii; *Servia*, 162 vi; *Sigurd*, 656 viii; *Sir Henry Bessemer*, 649 viii; *Sir William Fairbairn*, 864 viii; *Sir William Siemens*, 649 viii; *Slieve Bearnagh*, 641 vi; *Spree*, 589 ii, 162 vi; *Southwark*, 757 v, 218, 746 vi; Steamers for Canadian Atlantic service, 642 vi; *Stirling Castle*, 162 vi; *St. Louis*, description, 811 vi, 609 vii; run, 588 viii; trial, 843 vii; *St. Paul*, 155 viii; run, 588 viii; trial, 843 vii; *St. Petersburg*, 642 viii; *Suez*, 81 i; *Sumatra*, 626, 850 vii; *Sylvania*, description, 191, 443 vii; trials 843 vii.
- Tantallon Castle*, 193 vii; *Tartar*, 340 ii, 426 iv; *Tchihatchoff*, 183 v; *Tekoa*, 134 iv; *Telena*, 853 vii; *Tenasserim*, 79 i; *Teutonic*, 167, 361 i; 162 vi; voyages, 431 ii, 495, 793 iv; *Thames*, 635 vi; *Trave*, 188 v; trial, 590 vi; *Truma*, 430 viii; *Turret Cape*, 620 vii.
- Ulster*, 657 viii; *Umbria*, 185 v, 162 vi; trials, 293 iii; Union Dry Dock Co., building by, 208 viii; *Unique*, 430 vi.
- Victory*, description, 177 vii; trials, 765 vii; *Vienna*, 834 vi; *Vigilancia*, 217 vi; *Ville de Douvres*, 409, 539 iv.
- W. D. Rees*, 209 viii; *Werra* .....162 vi
- Yorktown* .....430 vi
- Zenith City*, description, 177, 621 vii; trials .....765 vii
- Mercury*, description .....640 vi
- Mercury* for test purposes .....167 vi
- Messageries Maritimes Co., report on Belleville and cylindrical boilers, 151 viii
- Metal structures, failure from fatigue .....1026 v
- Meteor*, German Navy, description and launch .....236 ii
- Meteor*, S. S., tests of machinery.—Kennedy, 227 i; trial data .....426 iv
- Milan* .....315 iv
- Milligan, R. W.—Discussion of paper on Experiment Station and Engineer School, 475 vii.

- Milton, J. T.—Discussion on marine boiler furnaces, 413 v; remarks on steam pipes, 522 vii; water-tube boilers, 931 v, 357 vi.
- Miner, L. D.—The contract trial of the U. S. S. *Newark*.....99 iii
- Minerva*, launch, 815 vii; trials.....832 viii
- Ministro Zenteno*, description and launch.....385 viii
- Minneapolis*, 459 iii, 721 v; description, 258 iii, 735 iv; description and trials, 598, 702 vi; particulars of machinery, follow 652 vi.
- Minneburg*, particulars.....428 viii
- Minnesota S. S. Co., freight steamers for.....129 iv
- Miwera*, description.....643 vi
- Missiones*, description, 383 viii; trials.....805 viii
- Mitis metal.....501 iii
- Modern cranes.—Warren.....147 vi
- Mohawk*, paddle wheel steamer, description and launch.....422 viii
- Mohawk*, S. S., Western Transit Co.....760 v
- Mohegan*, description and launch.....422 viii
- Monadnock*.....292 iv
- Monarch*, Austrian Navy, description.....417 vii
- Monarch*, H. M. S., description and trial.....800 vi
- Monmouth*, race with *Sovereign*.....873 viii
- Monsoon*, description and trial.....629 vii
- Monterey*, 292 iv; boilers for, 414 ii; description, 176 i; law authorizing construction, 243 i; trial, 115 v; weight of boiler, 662 vi.
- Montgomery*, 253, 351 i, 117, 294 iv; accident to port engine, 602 vi; grounding of, 1034 v; launch, 117 iv; trial, 175 vi.
- Moor*, lengthening of.....633 vi
- Morgan, Leo.—Union Iron Works' method of aligning shafting and boring out stern tubes, 7 v; contract trial of U. S. S. *Oregon*, 439 viii.
- Morison, D. B.—Experiments in connection with evaporation, 486 vii; marine boiler furnaces, 11 v; reply to discussion on, 420 v.
- Moritz, Albert.—Contract trial of the U. S. S. *Bennington*, 206 iii; horse-power of auxiliary machinery expressed as a fraction of horse-power of main engines, 217 iii.
- Morley, A. W.—Contract trial of the *Maine*.....1 vii
- Most economical speed of naval vessels.....654 iv
- Motive power of small vessels.....882 v
- Motors, electric, compressed air and vaporized oil, relative weight and power, 582 vi; electric, for driving tools, 552 vi.
- Moulding a cylinder in dry sand.—Leonard.....159 iv
- Moulding a cylinder in loam.—Kearney.....376 iv
- Mousquitaire*.....604 iii
- Mudd, T.—Tail shaft preserver.....712 v
- Mudd's engines, superheater and feed heater on *Inchmona*, 653 viii; evaporator, 492 vii.
- Myrtle*, particulars.....80 i



- Naiad*, 596 iii; launch.....131 iii  
*Namouna*, yacht, description of new machinery and trial, 1084 v; dimensions and speed, 440 vi.  
*Naphtha* yacht, description.....216 viii  
*Nashville*, arrangement of engines for working at low power, 597 vi; bids, 1037 v; description, 722 v, 176 vi; launch, 804 vii; test of evaporator, 95 viii.  
*Natter*, description, 385 viii; trials.....806 viii  
*Navahoe*, description.....650 v  
 Naval architecture, a manual of, by W. H. White.....443 vi  
 Naval construction and laws of similitude.—Normand.....284 vii  
 Naval Construction and Armaments Co., apparatus for testing ships' models, 788 viii; British cruisers building by, 557 viii; galvanizing and electrolytic plant, 792 viii.  
 Naval machinery, table showing progress in, follows.....652 vi  
 Naval Militia, necessity of Engineer divisions in.—Fry.....303 viii  
 Naval Vessels.—*Adamastor*, 606 vii, 852 viii; *Adler*, 426 ii; *Admiral Oushakoff*, description, 210 vi, 175 vii; trial, 839 vii; *Aegir*, 604 vii; *Aeolus*, 421 ii; *Agordat*, 199 viii; *Alabama*, 596, 797 viii; *Alarm*, description, 832 iv, 510 v; trial, 748 v; *Albatross*, H. M. S., 622 viii; *Albatross*, U. S. S., 497 vi; *Albion*, 807 viii; *Alert*, description, 518 v, 203 vi; trials, 428 vii; *Alexandra*, 493 vi; *Algerine*, description, 615 vi; trials, 393 viii; *Alliance*, 127 i; *Almirante Condel*, 585 ii; *Almirante Lynch*, 237, 585 ii; *Almirante Oquendo*, 841 vii, 638 vii; *Almirante Simpson*, description, 386 viii; trials, 611 viii; *Almirante Tamanderé*, 427 ii; *America*, 76 vii; *Amiral Pothuau*, 848 viii; *Amiral Trihouart*, 625 viii; *Ammiraglio Saint Bon*, 196 viii; *Amphitrite*, 827 viii; *Anakreon*, 426 ii; *Andrea Doria*, 423 ii; *Andromache*, 596 iii; *Andromeda*, 418, 813 vii; *Annapolis*, 581, 804 vii, 799 viii; *Anson*, 131 iii; *Apollo*, 596 iii; *Aquila*, 605 vii; *Aquilon*, description, 191 viii; trials, 405 viii; *Ardent*, 168, 423 vii; *Aréthuse*, 785 vi; *Aretusa*, 208 vi; *Argonaut*, 827 viii; *Ariadne*, 827 viii; *Ariete*, 182 i; *Arrogant*, 419, 814 vii, 617 viii; *Astraea*, description, 518 v; trials, 199 vi; *Astraea* and class, 171 viii; *Assaye*, 269 iii; *Atlanta*, description, 236, 249 i; trials, 353 i; *Aurora* (*Sampaio*), 177 vi; *Avon*, 844 viii.  
*Baltimore*, 685 vi; description, 236, 249 i; trials, 337 i, 122 ii; *Bancroft*, 408 ii; description, 352 i, 295 iv; trial, 204, 365 v; *Banshee*, 424 vii; *Barfleur*, description, 131 iii, 829 iv, 495 vi; trials, 182, 197 vi; *Barham*, 421 ii, 517, 743 v; *Barham* and *Bellona*, 391 viii; *Barracouta*, 232 ii; *Barrosa*, 583 ii; *Barroso*, 806 viii; *Basilisk*, 357 i; *Bathurst*, 142 iii; *Beagle*, 357 i; *Bennington*, description, 243 i, 417 ii; trial, 206 iii; *Blake*, 599 iii, 508 v, 614 viii; trials, 121 iv, 168 viii; *Blanche*, 131 iii; *Blanco Encalada*, 602 vi, 154 vii; *Blenheim*, description, 419 ii, 508 v; trials, 306, 831 iv; *Bonaventure*, 803 vi; *Boston*, description, 236, 249 i; trials, 252, 354 i; *Bouvet*, 623 viii; *Bouvines*, description,

## Naval Vessels.

- 235 ii; trials, 402, 604 vii, 403 viii; *Boxer*, 169, 715 vii; *Brandenburg*, 416 vi; *Brazen*, 820 vii, 621 viii; *Brazil*, two armored cruisers, 154 vii; *Brennus*, description, 601 iii, 806 vi; trials, 186 viii; *Brilliant*, 832 iv; *Brillante*, 421 ii; British, cruisers, Barrow built, 557 viii; cruisers, fleet, 804 vi; cruisers, new, 378 viii; Mediterranean fleet, trials, 795 viii; warships launched in 1892, 226 v; *Brooklyn*, 201 v; description, 805 iv, 804 vii; trial, 741 viii; *Brouix*, 235 ii; *Bruiser*, 419 vii; *Bruix*, 841 iv; *Buda Pesth*, 811 vii, 610 viii; *Buenos Aires*, 806 vii, 607 viii; *Bugeaud*, description, 519 iv, 1064 v, 408 vii; trials, 404 viii.
- Cæsar*, 423 vi, 810 viii; *Cambrian*, 510 v; *Camperdown*, 133 iii, 1041 v, 107 vi; *Canopus*, 807 viii; *Capitan Muniz Gamero*, description, 386 viii; trials, 807 viii; *Capitan Orella*, description, 368 viii; trials, 807 viii; *Capitan Pral*, description, 287 iii, 128 iv; trial, 231 v; voyage, 1066 v; *Caprera*, description, 620 vi; trials, 832 vii; *Caramuru*, 611 viii; *Carlo Alberto*, 850 viii; *Carlos V*, 434 vii, 201 viii; *Carnot*, description, 618 vi, 385 vii, 401 viii; trials, 625 viii; *Casabianca*, description, 206 vi; trial, 405 viii; *Cassard*, description, 204 vi, 626 viii; *Cassini*, 191 viii; trials, 430 vii, 405 viii; *Castine*, 206 ii; description, 351 i, 294 iv, 176 vi; trial, 846 v; *Catinat*, 205 vi, 849 viii; *Cécille*, description, 314 iv; trials, 180 i, 135 iii; *Centaur*, 134 iii; *Centurion*, description, 495 vi; trials, 1044 v, 168, 182 vi; *Chanzy*, 235, 422 ii, 841 iv; *Charlemagne*, 427 vi, 823 vii; *Charles Martel*, description, 1063 v; trials, 847 viii; *Charleston*, 70 v, 789 vii; description, 237 i; trials, 250, 310, 324 i; *Charner*, description, 235, 422 ii, 841 iv; *Charrybdis*, 605 vi; *Chasseloup-Laubat*, 408 vii; trial, 429 vii; *Chateaurunault*, 825 vii; *Chevalier*, 585 vi; *Chicago*, description, 236, 249 i, 383 viii; trials, 354 i; *Chili*, torpedo boat destroyers, 811 vii; *Chinese* cruisers, 612 viii; *Chishima-Kan*, 318 iv; *Chiyoda*, 428 ii; *Cincinnati*, 349 i, 416 ii, 293, 817 iv; *Circe*, description, 533 iv; trial, 510 v; *Coatit*, 199 viii; *Coetlogon*, 600 iii; trials, 618 vi; *Colombia*, U. S. of, gunboat for, 841 vii; *Columbia*, 576 ii, 567, 569 vii; description, 409 ii, 294, 513 iv, 11 vi; trial, 1034 v, 37 vi; *Comeur*, 603 iii; *Concord*, 417 ii; description, 243 i; trials, 578 ii, 89 iii; *Conflict*, 621 viii; *Contest*, 424 vii; *Corsaire*, 520 iv; *Corrientes*, 805 viii; *Cosmao*, 600 iii; *Crescent*, 616 vi, 415 vii; description, 134 iii; trial, 746 v; *Crête-a-Pierrot*, 193 viii; *Cristobal Colon*, 854 viii; *Cruisers*, British, Barrow built, 557 viii; fleet, 804 vi; new, 378 viii; *Chinese*, three new, 612 viii; *French*, recent trials of, 150 vii; *German*, triple screw, *M* and *N*, 631 viii; *Italian*, two new, 410 viii; *Portuguese*, new, 420, 851 viii; *U. S.*, new, data of actual performance at sea, 637 iv; our new, their coal supply, 796 iv; *Torpedo*, 409, 411 ii; *Cushing*, 580 ii, 459 iii; *Cyclone*, 850 viii.
- Daphne*, 86 i; *Daring*, 720 vii; description, 204 vi, 713 vii; trial, 605 vi; *D'Assas*, 204 vi, 404 viii; *Davout*, description, 272 iii, 314 iv; trial,

## Naval Vessels.

- 600 iii; *Decoy*, 804 vi; *D'Entrecasteaux*, 751 v, 626 viii; *Descartes*, description, 843 iv, 519 v, 805 vi; trials 626, 849 viii; *Desperate*, 621 viii; description, 820 vii, 182 viii; trials, 399, 842 viii; *D'Estrées*, 190 viii; *Detroit*, 253, 351 i, 117, 293 iv; trial, 500 v; *Devastation*, 1046 v; *Diadem*, description, 418, 814 vii, 828 viii; *Diana*, British, 170 viii; trials, 833 viii; *Diana*, Russian, 638 viii; *D'Iberville*, 1063 v, 806 vi; *Dido*, 388 viii; *Dolphin*, 236 i, 329 vii; *Doña Maria de Molina*, 855 viii; *Doris*, 390 viii; *Dragon*, French Navy, 520 iv; *Dragon*, H. M. S., 424 vii; *Dreadnought*, 493 vi; *Dryad*, description, 833 iv; trial, 614 vi; *DuChayla*, 204 vi, 188 viii; *Dunois*, 190 viii; *Dupuy de Lôme*, 1061 v; trials, 516, 839 iv, 429 vii; *Durandal*, 850 viii.
- Eclair*, 127 iv; *Eclipse*, description, 516 v, 604 vi; trials, 615 viii; *Edgar*, description, 134 iii; trial, 122 iv; *Elba*, 831 vii; *Electra*, 820 vii, 621 viii; *Emanuele Filiberto*, 196 viii; *Emperador Carlos V*, 360 i, 606 iii; *Emperor Nicholas I*, 424 ii; *Empress of India*, 163 viii; trial, 182 vi; *Endymion*, description, 134 iii; trials, 745 v; *Entre Rios*, 804 viii; *Ericsson*, 421 vi, 572 vii; trial, 793 vi; *Errazuriz*, *Presidente*, 528 iv; *Ersatz Leipzig*, 406 viii; *Esmeralda*, new, 385 viii; *Espigle*, 173 vii; *Espora* and *Rosales*, 285 iii; *Etruria*, 198 viii; *Europa*, 418, 814 vii; *Express*, 622 viii.
- Fame*, description, 820 vii, 182, 400 viii; *Fei Ying*, 811 vii, 162 viii; *Ferret*, 613 vi; *Fieramosca*, 236 ii; *Fleurus*, 520 v, 173 vii, 626 viii; *Flibustier*, description, 825 vii; trial, 430 vii; *Flora*, 605 vi; *Foam*, description, 820 vii, 182, 844 viii; *Forban*, description, 429 vi; trials, 825 vii; *Forbin*, 600 iii, 315 iv; trials, 180, 360 i; *Forte*, 129 iii, 118 iv; *Foudre*, 126 iv, 76, 824 vii, 403 viii; *Fox*, 119 iv; trial, 802 vi; *Franz Josef I*, 136 iii; *Frinant*, 408 vii; trials, 171, 429 vii, 375 viii; *Friesland*, 829 vii; *Frithjof*, 605 iii; *Fuji*, 419 viii; *Fuji Yama*, 632 vi; *Furious*, 419, 815 vii.
- Galatea*, 743 v; *Galilée*, 405, 627 viii; *Gangut*, 606 iii; *Garibaldi*, description, 605 viii; trials, 803 viii; *Gaulois*, 848 viii; *Geier*, 192, 631 viii; *Geiser*, 237 ii, 163 v; *General Admiral Apraxine*, 839 vii, 637 viii; *General Nerino*, 202 viii; *George the Victorious*, description, 129 iv, 420 viii; trials, 635 viii; German battleships and cruisers, 543 viii; *Gibraltar*, 134 iii, 534 iv, 731 v; trial, 738 v; *Gladiator*, 419 vii; *Gleaner*, 305 iv; trial, 120 iv; *Glory* and *Goliath*, 807 viii; *Gossamer*, 598 iii; *Göta*, 139 iii; *Governolo*, 620 vi; *Grafton*, 415 vii; description, 134 iii, 504 v; trials, 744 v; *Grasshopper*, 261 i; *Gremyastchy*, 605 iii; *Guardia Marina Riquelme*, 611 viii; *Guichen*, 825 vii; Gunboat, for U. S. of Colombia, 841 vii; Gunboat, stern wheel river, for French Navy, 523 iv.
- Halcyon*, description, 833 iv; trials, 614 vi; *Hallebarde*, 850 viii; *Handy*, description, 426 vii; trials, 393 viii; *Hannibal*, 423 vi, 612 viii; *Hardy*, 620 viii; *Harrier*, description, 833 iv, 426 vi; trials, 803 vi; *Hart*, 426 vii, 180 viii; trials, 393 viii; *Hashidate*, 316 iv;

## Naval Vessels.

- Haughty*, description, 823 vii; trials, 180, 397 viii; *Havock*, 203 vi, 426 vii; *Hawke*, 134 iii; *Hazard*, description, 833 iv; trial, 426 vi; *Hebe*, 533 iv; *Heimdal*, 800 vi; *Helena*, 727, 1037 v, 176 vi, 160 viii; *Henri IV*, 427 vi, 187 viii; *Hercules*, 220 v, 493 vi; *Hermione*, boiler tests, 151 vii; service trials, 815 vii; *Hildebrand*, 847 iv; *Hoche*, 428 vii; trial, 269, 602 iii; *Hohenzollern*, 431 vii; *Holland*, 829 vii; *Hood*, 182 vi; *Hornet*, 163 vi, 426 vii; trials, 424 vi, 426 vii; *Howe*, 133 iii, 491 vi; *Hunter*, 180 viii; trials, 393 viii; *Hussar*, 833 iv. *Illinois*, 596, 797 viii; *Illustrious*, 423 vi, 810 viii; *Indiana*, 292 iv, 575 ii; description, 409 ii, 492 v; trials, 421 vi, 637 vii; *Indefatigable*, description, 265 iii; trial, 120 iv; *Independencia*, 229 v, 809 vi; *Infanta Maria Teresa*, 360 i; description, 138 iii, 621 vi; trials, 960 v; *Infernet*, 190 viii; *Iowa*, 201 v, 383 viii; description, 811 iv; *Iroquois*, forced draft on launch of, 334 i; *Isis*, 618 viii; *Isly*, 603 iii; *Itsukushima*, description, 316 iv; trial, 145 iii.
- Janus*, description, 425 vii; trials, 835 viii; *Jaseur*, 833 iv; *Jason*, description, 532 iv; trial, 226 v; *Jauréguiberry*, description, 279, 603 iii, 1064 v, 616 vi; trials, 403, 624 viii; *Jean-Bart*, 314 iv; *Jeanne D'Arc*, 188 viii; *Jemmapes*, description, 235 ii; trials, 805 vi, 402 vii; *Junco*, 169 viii; *Jupiter*, 163 viii; *Jurien-de-la-Gravière*, 825 vii, 190 viii.
- K3*, French, 190 viii; *Kabyle*, 127 iv; *Kaiser Friedrich III*, 627 viii; *Kaiserin Augusta*, description, 126 iv; trials, 846 iv, 627 viii; *Kaiserin Elizabeth*, 584 ii; *Kaiserin und Königin Maria Theresia*, 153 vii; *Kasarski*, 171 v; preformance, 282 iii; trial, 426 ii; *Katakhdin*, 576 ii, 126 iii, 295 iv, 201 v; trial, 804 vii, 1 viii; *Kearsarge and Kentucky*, 160 viii; description, 581, 801 vii; *Kersaint*, 191 viii; *Khrabry*, 200 viii; *Komet*, 828 vii; *Kurfuerst Friedrich Wilhelm*, 465 iii.
- LaHire*, 190 viii; *Lalande*, 600 iii; *Lancaster*, injection valve, 88 i; *Landrail*, 261 i; *Lansquenet*, description, 206 vi; trials, 807 vi, 430 vii; *Lapwing*, 260 i; *Latona*, 596 iii; description, 420 ii; trial, 266 iii; *Latouche-Treville*, description, 235, 422 ii, 841 iv; trials, 172, 429 vii; *Leda*, 832 iv, 510 v; *Léger*, 603 iii; *Leipzig* (Ersatz), 827 vii; *Lévrier*, 845 iv; *Libertad*, 229 v; *Lightning*, description, 425 vii; trials, 172, 835 viii; *Liguria*, 199 viii; *Linois*, 842 iv; *Lombardia*, 198 viii; *Lt. Kasarski*, see *Kasarski*; *Lynx*, 170 vii; trials, 614, 805 vi, 821 vii.
- Machias*, 351 i, 206 ii, 117, 294 iv, 176 vi; trial, 720, 846 v; *Magnet*, 805 viii; *Magnificent*, description, 1038 v, 161 vii; trials, 811 vii; *Magicienne*, 178, 255 i; *Magpie*, 261 i; *Maine*, 411, 577 ii, 291 iv; description, 175, 239 i; trials, 719 v, 792 vi, 1 vii; *Majestic*, description, 1038 v, 167 vii; trials, 812 vii, 811 viii; *Mallard*, description, 820 vii, 182 viii; *Marathon*, 254 i; *Marblehead*, 253, 351 i, 294, 516 iv; trial, 129 vi; *Marceau*, 273 iii; *Marco Polo*, 633 viii; *Marietta*, 804 vii, 799 viii; description, 581 vii; *Mars*, 386 viii; *Massachusetts*, 409, 575 ii, 292 iv, 721 v; trial, 238 viii; *Masséna*, 315 iv, 603 vii; *Matsushima*, 316 iv;

## Naval Vessels.

- Medea*, 87 i; *Medusa*, 255 i; trials, 178 i; *Medusa* class, cost of and notes on foul bottom, 420 ii; *Melampus*, 596 iii; trial, 460 iii; *Melpomene*, 255 i; *Meteor*, 236 ii; *Milan*, 315 iv; *Minerva*, 815 vii; description, 516 v; trials, 832 viii; *Minstro Zenteno*, 385 viii; *Minneapolis*, 459 iii, 721 v; description, 258 iii, 758 iv; trial, 598, 702 vi; *Misiones*, 805 viii; *Monadnock*, 292 iv; *Monarch*, Austrian Navy, 417 vii; *Monarch*, H. M. S., 800 vi; *Monterey*, 414 ii, 29 iv; description, 176, 243 i; trial, 115 v; *Montgomery*, 253, 351 i, 117, 294 iv, 1034 v, 602 vi; trial, 175 vi; *Mousquetaire*, 604 iii.
- Naiad*, 131, 596 iii; *Nashville*, 1037 v, 804 vii, 95 viii; description, 722 v, 176, 597 vi; *Natter*, 385, 806 viii; *Navarino*, 425 ii, 605 iii; *Necochea*, 428 ii; *Newark*, 413 ii; description, 237, 249 i; trial, 99 iii; *Newport*, 804, 581 vii, 799 viii; *New York*, 407 ii, 126 iii, 117, 291 iv, 661 vi; description, 231 ii; transatlantic run, 571 vii; trials, 499, 613 v; *Niger*, 743 v; *Niobe*, 418, 814 vii; *Nipsic*, screw of, 356 i; Norwegian coast defence vessels, 635 viii; *Nueva España*, 606 iii; *Nueve de Julio*, 501 v; *Nymphe*, 86 i.
- Ocean*, 807 viii; *Odin*, 420 viii; *Olympia*, 408 ii, 293 iv, 652 vi; description, 230 ii, 815 iv; full power run, 581 viii; trials, 1033 v, 241 vi; *Onyx*, 832 iv; *Opossum*, 396, 843 viii; trial, 397 viii; *Orage*, 127 iv; *Oregon*, 575 ii, 292, 820 iv, 1034 v; description, 409 ii; trials, 602 vi, 439, 799 viii; *Orlando*, 91 i; *Oriel* or *Orel*, 237 ii; *Oslabya*, 200 viii.
- Pactolus*, 618, 834 viii; *Pallada*, 638 viii; *Pallas*, 268 iii; *Pandora* class, 358 i; *Paris*, 429 vi; *Partenope*, 423 ii; *Pascal*, description, 189 viii; trial, 849 viii; *Patria*, description, 176 vi; trial, 799 vi; *Peacock* class, 85 i; *Pearl*, 268 iii; *Pegasus*, 391 viii; *Pelayo*, 283 iii; *Pelican*, 319 iv; *Pelorus*, 419, 601 vii, 390 viii; *Pereswiche*, 200 viii; *Perseus*, 391 viii; *Petrel*, description, 237 i; trans-Pacific runs, 581 viii; trials, 252, 355 i; *Petrovavlovsk*, 174 vii; *Phæton*, 392 viii; *Philadelphia*, description, 243, 249, 355 i; voyage, 1032 v, 689 vi; trial, 412, 524 ii; *Philomel*, 583 ii; *Phæbe*, 598 iii; *Phænix*, description, 615 vi, 428 vii; trials, 171 viii; *Piemonte*, 180 i; *Piet Hein*, 808 vi; trial, 194 viii; *Pinto*, *Presidente*, 607 iii; trial, 528 iv; *Pique*, description, 130 iii, 211 v; trial, 216 v; *Plassy*, 421 ii; *Pomone*, 834 viii; *Porcupine*, 398, 835 viii; Portuguese cruisers, 851, viii; *Possadnik*, 228 v; *Pothuanu*, 841 iv; *Powerful*, description, 197 vi, 599 vii; trials, 613, 812 viii; *Prat*, *Capitan*, 128 iv; *Presidente Errazuriz*, 528 iv; *Presidente Pinto*, see *Pinto*; *Preussen* (Ersatz), 827 vii; *Prince George*, 423 vi, 813 vii; trials, 809 viii; *Princesa de Asturias*, 855 viii; *Princess Wilhelmina der Nederlanden*, 426 ii; *Princeton*, 804 vii, 799 viii; description, 581 vii; *Prometheus*, 391 viii; *Proserpine*, 419, 815 vii; *Protet*, 189 viii; Protected cruisers (German), 828 vii; *Pyramus*, 391 viii.
- Quail*, 820 vii; *Quiros*.....435 vii
- Rainbow*, description, 211 v; trial, 216 v; *Raleigh*, 349 i, 416 ii, 293 iv; service trial, 298 viii; *Ram Cruiser D*, Austria, 161 viii; *Ramillies*,

## Naval Vessels.

- description, 306 iv, 740 v, 182 vi; trial, 741, 1041 v; *Ranger*, H. M. S., 397 viii; *Ranger*, U. S. S., test of French briquettes, 578 vii; *Rapid Cruisers Nos. 1 and 2*, French, 602 vii; *Recruit*, 820 vii, 841 viii; *Renard*, 1061 v; *Renown*, 163, 641 viii; description, 515 v, 427 vii; trials, 386 viii; *Republica*, 527 iv; *Repulse*, 512 v, 182 vi; *Resolution*, 188, 482, 493 vi; trials, 1039 v, 182 vi; *Restauracion*, 638 viii; *Retribution*, description, 211 v; trial, 216 v; *Re Umberto*, description, 410 viii; trials, 207 vi, 195 viii; *Revenge*, 541 vii; description, 223 v; trials, 172, 182, 188 vi; *Revenue Cutter No. 3*, 160 viii; *Ringdove*, 422 ii; *Rocket*, 179, 621 viii; trials, 805 vi, 423 vii, 175 viii; *Rossija*, 433 vii, 637 viii; *Rostislav*, 853 viii; *Royal Arthur*, 347 vii; description, 263 iii; *Royal Oak*, description, 221 v, 184 vi; trials, 182, 187 vi; *Royal Sovereign*, 476, 489 vi, 347 vii; description, 261 iii; trials, 295 iv, 182 vi; *Rurik*, 606 iii, 228 v; description, 425 ii; trials, 433 vii.
- Saint Louis*, 427 vi, 847 viii; *Salamander*, 620 viii; *Salmon*, description, 844 viii; trials, 817 vii; *Samoyede*, description, 607 vii; trials, 840 vii; *Sampaio (Aurora)*, 177 vi; *Sandfly*, description, 89 i; trials, 179 i; *San Francisco*, description, 243, 355 i; trials, 413, 537 ii; *San Martin*, 605 viii; *Sanspareil*, 197 vi, 347 vii; trial, 84 i; *Santa Fe*, 609 viii; *Sappho*, 830 iv; *Sardegna*, 620 vi; 173 vii; *Sarrasin*, 166 vi; *Satellit*, 619, 423 vi; *Seagull*, 172 viii; trial, 234 ii; *Sfax*, 315 iv; *Shark*, 170 vii; trials, 423 vii, 175 viii; *Sharpshooter*, 1031 v, 414 vi; trials, 262, 357 i, 416, 601, 822 vii, 379 viii; *Sheldrake*, 234 ii; *Sicilia*, 604 iii, 583 viii; description, 410 viii; trials, 195 viii; *Sinope*, 237, 424 ii; *Sirius*, 596 iii, 363 vii; *Skate*, 620 viii; *Skipjack*, 234 ii; *Skjold*, 612 viii; *Snapper*, description and trials, 844 viii; *Sokol*, description, 606 vii; trials, 833 vii; Spanish battleship and cruisers, 853 viii; *Spanker*, 234 ii, 821 vii, 835 viii; trials, 583 ii, 392 viii; *Sparrowhawk*, 820 vii; trials, 842 viii; *Spartan*, 300 iv; *Spartiate*, 827 viii; *Speedwell*, 234 ii; *Speedy*, description, 684 v, 350 vi; trials, 199, 427 vi, 416 vii; *Spetzia*, 320 iv; *Spider*, 179 i; *Spitfire*, 843 viii; *Standard*, 434 vii; *Star*, 841 viii; *Starfish*, 818 vii; Stern-wheel steamer for Argentine, 248 v; *St. George*, description, 134 iii; trial, 198 vi; *Sturgeon*, 822 vii; trials, 425, 602 vii; *Suchet*, 428 vi; *Sultan*, 600 vii; *Sunfish*, 822 vii, 181 viii; *Surcouf*, 600 iii; *Surly*, 423 vii, 175 viii; *Surprise*, description, 205 vi; trials, 405 viii; *Swordfish*, 618, 843 viii; *Svetland*, 607 vii, 200 viii; *Sybille*, description, 421 ii; trial, 304 iv.
- Tage*, 313 iv; trials, 462 iii; *Talbot*, description, 516 v, 427 vii; trials, 616 viii; *Tatsuta*, 429 vi; *Teazer*, 621 viii; *Tegethoff*, 421 vi; *Temerario*, 319 iv; *Teniente Serrano*, 611 viii; *Terpsichore*, 596 iii; *Terrible*, description, 197 vi; 584 vii; trials, 613, 811 viii; *Texas*, 515 iv, 592 viii; description, 177, 239 i, 291 iv; trials, 421, 600 vi, 82 viii; *Thénard*, description, 192 viii; *Theseus*, description, 134 iii, 1049 v; trial, 198 vi; *Thetis*, 596 iii; *Thrasher*, 820 vii, 181 viii; *Three Saints (Tri Sviateitelia)*, 211 vi; *Thule*, 521 v; *Thunderer*, 453 v; *Tiradentes*, 527 iv; *Torch*, description, 518 v, 203 vi; trials, 601 vii; Torpedo Boats, see

## Naval Vessels.

- under T; *Torpedo Boat Destroyers*, Barnaby & Thornycroft, 711 vii; British 30-knot, 820 vii, 186, 400, 622 viii; British 32-knot, 401 viii; Russian 30-knot, 201 viii; Spanish, 202 viii; *Torpedo Cruiser No. 1*, U. S., 409 ii; description, 411 ii, 127 iii; *Torpedo Gunboats*, English Navy, 598 iii; for England and other countries, 301 iv; *Trafalgar*, 254 i, 491 vi; *Tréhouart*, 423 ii; 750 v; *Trenton*, 735 iv; *Tribune*, 264, 596 iii; *Troude*, 600 iii; trial, 270 iii; Turkish gunboats, 810 vi; Turkish vessels under construction, 232 v.
- Umbria*, 620, 809 vi, 197 viii; *Undaunted*, 235 ii; *Urania*.....604 iii
- Valkyrien*, 851 viii; *Valmy*, 235 ii; *Vandalia*, 73 i; *l'autour*, 236 ii; *Veinte Cinco de Mayo*, 140 iii; *Venus*, description, 815 vii; trials, 830 viii; *Vesuvius*, 82, 242, 249 i, 231, 417 ii; *Vicksburg*, 804 vii, 799 viii; description, 581 vii; *Victoria*, sinking of, 693 v, 37 vi; trials, 84 i; *Victorious*, description, 423 vi, 813 vii; trials, 808 viii; *Vierny*, 200 viii; *Vindictive*, 419 vii, 170 viii; *Viper*, 384, 806 viii; *Virago*, 820 vii, 181 viii; *Viscaya*, 360 i, 606 iii; trials, 810 vi; *Vittor Pisani*, 830 vii; *Vulcan*, 118 iv, 75 vii; description, 820 iv; trials, 461, 599 iii; *Vulture*, 820 vii.
- Wallaroo*, formerly *Persian*, 129 iii; *Walter Q. Gresham*, 803 viii; *Wampanoag*, 713, 735 iv; *Wattignies*, description, 280 iii; trial, 844 iv; *Wheeling*, 583, 804 vii, 799 viii; *Whiting*, torpedo boat destroyer, 841 viii; *Whiting*, torpedo gunboat, 358 i; *Widgeon*, 235 ii; *Wien*, 811 vii; *Wilmington*, 1037 v, 804 vii; description, 727 v, 176 vi; *Wisconsin*, 596, 797 viii; *Wizard*, 358 i, 621 viii; *Woerth*, description, 846 iv; trials, 808 vi, 430 vii; *Wojewoda*, 228 v.
- Yashima*, 414 viii; *Yorktown*, 36 i; description, 237, 249, 268 i; trials, 137 i; *Yoshino*, description, 231 v; trial, 1068 v.
- Zebra*, 181, 621 viii; *Zeeland*.....829 vii
- Navarino*.....605 iii
- Navy, French, regulations for preservation of boilers when not in use, 800 iv; Great Britain, estimates, 1896-'97, 376 viii; United States, new ships for, 493 iv; sail power for new ships of, 799 iv.
- Neptune*, description.....640 vi
- Nero*, weight and particulars of boilers.....395 vi
- New Alcione*, description.....445 vii
- Newark*, law authorizing construction, 237 i; machinery space, 249 i; trial, 99 iii.
- New Cunarders.....324 iv
- New forms of evaporators.—Baird.....495 ii
- New Hampshire*, Sound steamer, description and trial.....323 iv
- Newport*, 799 viii; bids and contract, 804 vii; description.....581 vii
- New ships for United States Navy.....493 iv
- New York*, 117, 291 iv; bids, 407 ii; description, 230 ii; increase in length and displacement, 126 iii; launch, 117 iv; transatlantic run, 571 vii; trials, 499, 613 v; weight of boilers, 661 vi.

- New York*, S. S., description, 166 i; record voyage, 791 vi; speed, 99 iv; speed, best, 1019 v.
- Nickel-steel armor trials at Creuzôt.....1028 v
- Niclausse tubulous boilers, 402 vii; description and management.—Robinson, 365 vii.
- Niger*, trial.....743 v
- Nile*, trial and description.....1069 v
- Niobe*, dimensions.....418, 814 vii
- Nipsic*, propeller.....356 i
- Non-algebraic curves, treatment of for maxima and minima by ordinates, 71 iv
- Norman*, description and trials, 178 vii; dimensions.....834 vi
- Normand, J. A.—Discussion of papers on water tube boilers, 507 viii; engine vibration, 980 v; laws of similitude in reference to naval construction, 284 vii.
- Normand's tubulous boiler.....491 iv
- Normannia*, description and trial, 237 ii; voyages.....218 vi
- North German Lloyd, new steamer, 852 vii; express steamers, description, 646, 860 viii; new steamers, description, 207, 861 viii.
- Northland*, launch.....178 vii
- Northwest*, description, 212 vi; trial.....430 vi
- Norton, H. P.—Discussion on tubulous boilers, 210 ii; engine room signals, 197 iii; repairing broken valve chest on *Concord*, 761 vi; speed trials of fast ships, 68 ii; trial of *Baltimore*, 337 i; of *Yorktown*, 137 i.
- Norway, coast defence vessels, particulars.....635 viii
- Notes on modern boiler shop practice.—Engard.....129 ii
- Notes on the effect of temperature on certain properties of various metals and alloys.—Bryan, 144 ii.
- Nueve de Julio*, description and trial.....501 v
- Nulton, L. M.—Discussion of paper on Experiment Station and Engineer School, 468 vii; temperature-entropy diagrams for steam and water, 285 viii.
- Nymphe*, trials.....86 i
- Obituary Notices.—Baker, Charles H.....435 viii
- Baker, J. H.....589 ii
- Copeland, Chas. W.....201 vii
- De Valin, Chas. E.....872 iv
- Greene, Albert S.....435 viii
- Heaton, W. W.....636 vii
- Hine, R. B.....635 vii
- Kirk, Alexander C., LL. D.....870 iv
- Talcott, C. G.....270 i
- Voorhees, P. R.....218 viii
- Wells, Edwin.....96 i
- Whitaker, E. J.....635 vii
- Woods, A. T.....255 v



- Ocean*, description.....378, 807 viii  
*Odin*, launch and particulars.....420 viii  
 Officers, Members and Associates of the Society, 149 iii, 147 iv, 259 v,  
 229 vi, 203 vii, 223 viii.  
*Ohio*, description.....619 vii  
 Oil motors, vaporized, weight and power of.....582 vi  
 Oils, detecting adulterations in olive.....162 i  
*Olympia*, 293 iv; bids, 408 ii; description, 230 ii; full power run, 581 viii;  
 launch and description, 815 iv; particulars of machinery, follow 652  
 vi; trials, 1033 v, 175, 241 vi.  
*Oneonta*, description.....630 vii  
*Onyx*, torpedo gunboat, description.....832 iv  
*Ophir*, description, trials and voyages.....135 iv  
*Opossum*, breakdown, 843 viii; particulars, 396 viii; trial.....397 viii  
*Oquendo*, *Almirante*, see *Almirante Oquendo*.  
*Orage*, description.....127 iv  
 Ordnance trials, British.....168 vi  
*Oregon*, 292 iv; Act of Congress for and description, 409 ii; auxiliary  
 machinery, 820 iv; changes in and bids, 575 ii; launch, 1034 v; trials,  
 602 vi, 439, 799 viii.  
*Oriel* or *Orel*, trial.....237 ii  
*Orlando*, particulars.....91 i  
 Orsat combustion tester on *Sicilia*.....583 viii  
*Oslabya*, dimensions.....200 viii  
*Oushakoff*, *Admiral*, see *Admiral Oushakoff*.  
 Overheating in the fire surfaces of boilers.....201 ii  
  
 Pacific Coast coals.—Roelker.....69 i  
*Pactolus*, description.....834 viii  
 Paddle-wheel steamer, *Isle of Arran*.....525 v  
 Paddle-wheels, comparison of radial and feathering.....580 iv  
 Painting wood and iron.—Brown.....713 v  
*Pallas*, trial.....268 iii  
*Pallada*, notice.....638 viii  
*Pandora* class, description.....358 i  
 Particulars of machinery of U. S. naval vessels.....422 iii  
*Paris*, Russian Navy, description.....429 vi  
*Paris*, S. S., accident to and explanation thereof, 238, 429 ii, 122 iii, 290  
 vi; description, 166 i; description of new machinery, 467 iii; transatlan-  
 tic runs, 167, 270 i, 99, 494, 792 iv, 755 v.  
 Parsons, H. DeB.—New police boat for New York City.....345 vi  
 Parson's steam turbine.....899 v  
*Partenope*, description and trial.....423 ii  
*Parthenia*, description and launch.....661 viii  
*Pascal*, consumption trial, 849 viii; particulars.....189 viii  
 Patchell, W. H.—Notes on steam superheating.....346 viii

- Patent log, is it maligned.....227 ii
- Patria*, description and trial.....176, 799 vi
- Patrol*, police boat for New York City.—Parsons.....345 vi
- Peabody, Cecil H.—Test of pumping engine, Newton Water Works.....769 v
- Peacock* class, trials.....85 i
- Pearl*, trial.....268 iii
- Peck-Wheeler system of feed-water heating.....196 v
- Pectan*, description.....853 vii
- Pegasus*, particulars.....391 viii
- Pelayo*, description and trial.....283 iii
- Pelenkdideria* (*Sea Tiger*), launch and particulars.....856 viii
- Pelican*, Austrian torpedo depôt-ship, description.....319 iv
- Pelorus*, description and launch, 390 viii; dimensions.....419, 601 vii
- Pennsylvania*, dimensions, 851 vii; launch and particulars.....862 viii
- Pensacola*, particulars, follow.....652 vi
- Peregrine*, description.....630 vii
- Pereswich*, dimensions.....200 viii
- Peru*, description and trial.....233 v
- Perseus*, particulars.....391 viii
- Personnel* of engineer's force for war vessels.....747 iv
- Petersburg*, description.....633 vi
- Petrel*, law authorizing construction, 237 i; trans-Pacific runs, 581 viii; trials, 252, 355 i.
- Petroleum, briquettes, 1030 v; fuel in Italian Navy, 282 iii; regulations for vessels passing through the Suez Canal, 107 iv; residuum, effect of shell fire on tanks of, 486 v; tank steamer, *America*, 867 iv.
- Petroparlovsk*, description.....174 vii
- Phæton*, trials after refit.....392 viii
- Philadelphia*, law authorizing construction, 243 i; machinery space, 249 i; launch, 355 i; run from Callao to Honolulu, 1032 v, 689 vi; trials, 231, 412, 524 ii.
- Philomel*, description, launch and cost.....583 ii
- Phœbe*, trial.....598 iii
- Phœnix*, description, 615 vi; dimensions, 428 vii; trials.....171 viii
- Phosphor bronze.....495 iii
- Physical reasons for rapid corrosion of steel boiler tubes.—Gibbons....413 vii
- Piemonte*, description and trials.....180 i
- Piet Hein*, description, 808 vi; particulars and trial.....194 viii
- Pilgrim*, S. S.....849 iv
- Pilgrim*, yacht, conversion from sailing to steam yacht, 441 vi; description, 652, 998 v.
- Pinto, Presidente*, description and trial.....528 iv
- Pioneer*, description and trial.....245 v
- Pipe flanges, copper, standard dimensions.....421 iii
- Pipes, steam.—Brett, 347 v; experiments to determine cause of explosions.—Wachsmann, 737 vii; remarks on.—Milton, 522 vii; tests of wound copper.—Wachsmann, 510 vii; welded steel.—Hill, 731 vi.

- Pique*, description, 130 iii, 211 v; trial.....216 v
- Piston, broken L.P. steel, of *Charleston*.....789 vii
- Pistons, effect of polishing on economy of working.....593 vi
- Pitting in marine boilers.....689, 691 iv
- Planimeter, Amsler's polar, description.....665 v
- Plassy*, description and launch.....421 ii
- Plymouth*, description, 587 ii; dimensions.....849 iv
- Police boat for New York City.—Parsons.....345 vi
- Polynesian*, description and performance, 290 iii; weight and particulars of boilers, 395 vi.
- Pomone*, description, 834 viii; trials.....436 vii
- Popoffkas.....2 vi
- Porcupine*, description and trials.....398, 835 viii
- Porter, J. S.—Test of Bailey air-pump.....768 vi
- Portland cement for steam joints.....194 v
- Portugal, new cruisers, bids and description.....420, 851 viii
- Possadnik*, trial.....228, 752 v
- Pothuan*, description.....841 iv
- Potts, Stacy.—Machinery of the torpedo boat *Cushing*.....215 ii
- Poursuivante*, description.....173 vii
- Powell, W. B.—Steam plant of *Iroquois*.....446 vi
- Power and weight, relative, of electric, compressed air and vaporized oil motors, 582 vi.
- Power, motive, of small vessels.....882 v
- Power required for electric welding.....780 vi
- Powerful*, brief mention, 516 v; description, 197 vi, 599 vii; description and trials, 613, 812 viii.
- Prat, Capitan*, description.....128 iv
- Pray's steam tables and engine constants.—Thos. Pray, Jr.....845 vi
- Précieuse*, description.....173 vii
- Prellier, C. S. Du Riche.—Electrical efficiency.....581 vi
- Premiums and penalties on speed trials.....34 vii
- Preservation of boilers when not in use, regulations of French Navy, 800 iv; of marine boilers.—Leonard, 179 iii; discussion on.—Baird, 438 iii.
- Presidente Errazuriz*.....528 iv
- Presidente Pinto*, 607 iii; description and trial.....528 iv
- Pressure permissible in marine boilers, proposed rule for, in steamboat inspection service, 219 iv.
- Preussen* (Ersatz), dimensions.....827 vii
- Prince George*, dimensions, 423 vi; launch, 813 vii; trials.....809 viii
- Princesa de Asturias*, description and launch.....855 viii
- Princess Wilhelmina der Nederlanden*, description.....426 ii
- Princeton*, 799 viii; bids and contract, 804 vii; description.....581 vii
- Prinses Marie*, paddle steamer, Howden's forced draft on.....840 vi
- Prinz Heinrich*, description and trial, 437 vii; dimensions.....839 vi
- Prinz Regent Luitpold*.....437 vii

- Priscilla*, description.....436 vi  
 Progressive trials, data of, for typical ships of British Navy.....303 iv  
*Prometheus*, particulars.....391 viii  
 Propellers, comparison of some, for U. S. naval vessels, 400 iv; efficiency, influence of shock on, 611 iv; efficiency of manganese bronze, 220 i; *Medusa's*, 255 i; *Nipsic's*, 356 i; notes on action of screw.—Kinkaid, 124 i; screw, arrangement of surface, 300 v; screw, of U. S. naval vessels, 157 iv; screw, study of an element of, 73 iv; trials of *Kaiserin Augusta*, 627, 782 viii,—*Katahdin*, 1 viii,—*Minneapolis*, 600 vi.  
 Propulsion, phenomena attending ship.—Isherwood, 97 i; Mattice, 223 i; some problems in.—Weaver, 59 i.  
 Propulsive power of screw ships.—Warrington.....259 vi  
*Proserpine*, dimensions, 419 vii; Thornycroft boilers.....815 vii  
 Protected cruisers (German) three, dimensions.....828 vii  
*Prolet*, particulars.....189 viii  
 Pumping engines, Newton Water Works, 769 v; test of high service, at Washington.—Baird, 41 i; triple expansion, digest of Longridge's experiments on.—Isherwood, 215 vii.  
 Pumps, and pumping systems for war vessels, 727 iv; air.—Bailey, 518 vi, discussion on, 765 vi, 132 vii; air, Bailey, test, 768 vi; air, circulating and feed, relation of horse power and revolutions, and coal expenditure for, 675 iv; air and circulating, of *Dolphin*, power required for, 135 vii; centrifugal, theory of, 335, 483 iii; circulating, 295 v; hydraulic, of *Maine*, 22 vii; rubber, for World's Columbian Exposition, 203 iv.  
*Puri*, description and trial.....644 viii  
*Puritan*.....849 iv  
 Purves' ribbed flues.....452 iii  
*Pyramus*, particulars.....391 viii
- Quadruple expansion engines, causes operating to prevent their substitution for triple expansion, 153 i; data of.—Bieg, 77 i; diameters of cylinders.—Gow, 150 i; steamers fitted with, 77 i; of *Adria* and *Armenia*, 648 viii; *Barbarossa* and *Bremen*, 861 viii; *Comanche*, 207 viii; *Elizabeth Rickmers*, 425 viii; *Friedrich der Grosse*, 861 viii; *Gedeh*, 864 iv; *Inchmona*, 422 viii; *Königin Luise*, 861 viii; *Minneburg*, 428 viii; *Pennsylvania*, 862 viii; *Tantallon Castle*, 194 vii; yacht —, 874 viii.
- Quail*, launch and general dimensions.....820 vii  
*Queen City*, particulars and launch.....208, 652 viii  
*Queen Olga*, arrangement of engines for working at low power.....596 vi  
 Questions in parliament.....167 vi  
 Quiggin's evaporator.....491 vii  
*Quiros*, description.....435 vii
- Race of steam yachts in the Mediterranean, 440 vi; *Sovereign* and *Monmouth*, 873 viii.  
 Radial valve gears.....525 iii

- Radius of action of new United States cruisers.....637 iv
- Rae, C. W.—Discussion of paper on Experiment Station and Engineer School, 463 vii.
- Rainbow*, description, 211 v; trial.....216 v
- Raleigh*, 349 i, 416 ii; forced draft trial.—Roelker, 298 viii; launch, 293 iv; supports for boring bars for stern tubes and struts.—Roelker, 340 v.
- Ram cruiser D*, for Austria, description.....161 viii
- Ramapo*, description and launch.....868 viii
- Ramillies*, description and launch, 306 iv; machinery, 740 v; trials, gun, 1041 v; trials, steam, 515, 741 v.
- Ranger*, H. M. S., description and trials.....397 viii
- Ranger*, U. S. S., test of French briquettes.....578 vii
- Ransom, G. B.—Discussion of paper on Experiment Station and Engineer School, 477 vii.
- Rapid cruisers Nos. 1 and 2*, France, description.....602 vii
- Raynal, A. H.—Diagram for finding I.H.P.....378 v
- Rayner's evaporator.....491 vii
- Recruit*, general data, 820 vii; launch.....841 viii
- Reciprocating parts, correcting diagrams for weight of, 283 i; influence of weight of, 271 i.
- Record, the Atlantic, 494, 792 iv; westward.....569 vii
- Red D Line, new steamer, description.....436 vii
- Reed, feed regulator and water tube boilers on *Porcupine*.....398, 839 viii
- Refrigerating machinery, carbonic acid, 783 iv; the Allen dense air, 771 iv; on *Minneapolis*, 725 vi; on *Oregon*, 465 viii.
- Register for speed trials.—Weaver.....86 iii
- Regulation of an electric lighting station.....571 vi
- Reina de los Angeles*, description and launch, 427 viii; trial.....652 viii
- Reina Maria Cristina*, particulars.....168 i
- Renard*, trial.....1061 v
- Renown*, boiler weights, 641 viii; description, 515 v, 427 vii, 163 viii; trials, 387 viii.
- Repairs, see Breakdowns and Casualties and repairs.
- Repair ships, notes on.—McFarland.....71 vii
- Repair shop, floating, the *Vulcan*, of British Navy.....820 iv
- Report on the trials of *Fusi Yama*, *Colchester* and *Tartar*.....340 ii
- Republica*, description.....527 iv
- Repulse*, trials.....512 v
- Research Committee of Institution of Mechanical Engineers, report on trial of S. S. *Ville de Douvres*, 409 iv.
- Resolution*, behavior at sea, 188, 482 vi; effect of bilge keels on, 539 vii; trials, 1039 v.
- Restauracion*, particulars and trial.....638 viii
- Retarders in boilers.—Whitham.....777, 779 viii
- Retribution*, description, 211 v; trial.....216 v
- Re Umberto*, description of machinery, 410 viii; trials.....207 vi, 195 viii

- Revenge*, description, 223 v; rolling experiments on.—White, 541 vii; trials, ordnance, 172 vi; trials, steam, 188 vi.
- Revenue Cutter No. 3*, bids and contract.....160 viii
- Revenue Cutters, new.—McAllister.....561 vii
- Review and test of steam plant of S. S. *Iroquois*.—Selden.....445 vi
- Revolution recorder—Weaver—On trial of *Bancroft*.....377 v
- Richard Peck*.....857 iv
- Rickmers, Elizabeth, Ellen and Marie*, machinery particulars....425, 654 viii
- Ringdove*, trial.....422 ii
- Rivets, diagrams for standard lengths and proportions.....421 iii
- Riveted joints, formulæ for proportioning, 403 iv; tests of, at Watertown arsenal, 624 iv, 727 viii.
- Robert Fulton*, description and launch.....864 viii
- Robinson, Leslie.—Discussion of paper on calculation of horse power, 317 viii; of papers on water tube boilers, 509 viii.
- Robison, John K.—Tubulous boilers in the French Navy.....365 vii
- Rocket*, breakdowns, 179, 621 viii; description and trials, 805 vi, 423 vii, 175 viii
- Roelker, C. R.—Forced draft trial of *Raleigh*, 298 viii; Pacific coast coals, 69 i; supports for boring bars for stern tubes and struts, 340 v.
- Roland*, dimensions and trial.....1077 v
- Roller steamer *Ernest Bazin*, description and launch.....870 viii
- Rolling experiments on *Revenge*.—White.....541 vii
- Rolling of British ships in squadron.....477 vi
- Rona*, description.....221 vi
- Ross, H. S.—Discussion of paper on Experiment Station and Engineer School, 475 vii.
- Rossija*, description and launch, 637 viii; to have triple screws.....433 vii
- Rostilav*, description and launch.....853 viii
- Rotterdam*, dimensions.....208 viii
- Royal Arthur*, coal consumption, 347 vii; description.....263 iii
- Royal Oak*, description, 221 v, 184 vi; trials.....182, 187 vi
- Royal Sovereign*, coal consumption, 347 vii; description, 261 iii; description, weight of machinery and trials, 295 iv; rolling of, 476 vi; speed and power, 489, 493 vi.
- Rumley, J. Mair.—Discussion of paper on dryness of steam.....324 vii
- Rurik*, 605 iii; description, 425 ii; launch, 228 v; trials and description, 433 vii.
- Rusée*, description.....173 vii
- Russia, fast torpedo boats for, built by Schichau.....845 iv
- Safety valves, proposed rules for area, in steamboat inspection service...229 iv
- Sailing vessels, large.....290 iv
- Sail power for our new Navy.....799 iv
- Sainte Marie*, car ferry, description.....759 v
- Saint Louis*, description, 427 vi; launch.....847 viii
- Salamander*, water tube to replace locomotive boilers.....620 viii

- Salmon*, description, 844 viii; trials.....817 vii
- Samoa*, some lessons from.—McKean.....209 i
- Samoa*, the largest cargo steamer in the world.....867 iv
- Samoyede*, description, 607 vii; trials.....840 vii
- Sampaio (Aurora)*, description.....177 vi
- Sandfly*, experience during manœuvres, 89 i; trials.....179 i
- San Francisco*, launch, 355 i; law authorizing construction, 243 i; particulars of machinery, follow 652 vi; trials.....413, 537 ii
- Saniter, E. H.*—The elimination of sulphur from iron.....757 iv
- Sankey, Capt.*—Discussion of paper on dryness of steam.....320 vii
- San Martin*, description.....605 viii
- Sanspareil*, additional bulkheads, 197 vi; coal consumption, 347 vii; description and trials, 84 i.
- Santa Fe*, description and trial.....609 viii
- Sappho*, description and trial.....830 iv, 218 v
- Sardegna*, description and preliminary trials, 173 vii; trials.....620 vi
- Satellit*, comparison of boilers with those of *Speedy*, 394 vi; description, 423 vi; I.H.P., 619 vi.
- Santiago*, particulars.....363 i
- Scale*, boiler, its formation, prevention, &c.....685 iv
- Scantlings of ships' bulkheads*.....787 iv
- Schell, F. J.*—Formulæ for proportioning riveted joints and calculating the width and thickness of butt straps for steel boilers, 403 iv.
- Schlick's quadruple expansion engines of Longmoon*.....655 viii
- Scholt and Gens*, gauge glasses.....192 v
- Schwörer's superheater*, description and tests.....365 viii
- Scott, John.*—Discussion of paper on transmission of heat through tube plates, 460 v.
- Scottish Hero*, description and trial.....852 vii
- Scow*, screw, gas engine for.....415 vi
- Screw data of vessels of the U. S. Navy*, precede.....765 vi
- Screw propeller*, action, note on.—Kinkaid, 124 i; experiments on *Daring*, 726 vii; study of an element of.—Durand, 73 iv.
- Screw propellers* (see also propellers), apparatus for ascertaining efficiency of, 970 v; arrangement of, on *Chevalier*, 586 vi; arrangement of the surface of.—Walker, 300 v; Dickinson, trial on *Herongate* and *Belle of Dunkerque*, 313 v; of U. S. naval vessels, 157 iv; triple, 289 iv; triple, of *Minneapolis*, 599 vi.
- Screw turbine propeller*, Thornycroft's.....479 v
- Scud*, boiler details, 874 viii; description and trials.....663 viii
- Scylla*, description and trial.....218 v
- Seaford*, description.....838 vi
- Seagull*, accident to machinery, 457 iii; trials, 234 ii, 715 v; to have Niclausse boilers, 172 viii.
- Seaton, A. E.*—Discussion of paper on transmission of heat through tube plates, 461 v; of paper on watertight doors, 341 viii; lightest form of engine columns, 364 vii.

- Seaton & Roundthwaite's pocket book.....443 vi  
 See, Horace.—Discussion on trial trips.....164 iii  
*Seine*, description.....635 vi  
*Seguranca*, description.....429 ii  
 Selden, W. C.—Review and experimental test of steam plant of S. S.  
*Iroquois*, 445 vi.  
*Senator*, description and launch.....652 viii  
 Separators, steam, efficiency.....591 iii  
 Serpollet boiler.....588 iii  
 Serve boiler tube, 345 iii; comparative trial of boilers fitted with the  
 ordinary and with the Serve tube, 569 ii; conditions of maximum  
 efficiency, 288 iv; tests, 748, 785 vi.  
*Sfax*.....315 iv  
 Shaft, broken, of *Trave*, 188 v; *Umbria*, 185 v; tail, preserver.—Mudd...712 v  
 Shafting, *Cincinnati*, running lines for, 1 v; practice of Union Iron Works  
 in aligning, 7 v; outboard, of S. S. *Columbia*, *Normannia* and *City of*  
*Paris*, weight and dimensions, 306 vi.  
 Shafts, failure from fatigue, 1027 v; hollow and solid, curves showing  
 relation between, 507 vii; preservation of, 364 i.  
*Shark*, bursting of boiler tubes, 170 vii; description and trials, 423 vii, 175 viii  
*Sharpshooter*, Belleville boilers for, 1031 v, 414, 591 vi; coal consumption  
 for 30 hours, 416 vii; description and trials, 262, 357 i; sustained power,  
 804 vi; trials of Belleville boilers, 601, 822 vii, 379 viii.  
*Sheldrake*, to be strengthened.....234 ii  
 Shiebler, A.—Steam plant of *Iroquois*.....446 vi  
 Shipbuilding programme, England, 486 v, 145 vii; France.....749 v, 146 vii  
 Shipbuilding in United States.....159 v  
 Ships, United States, classification of, according to displacement.....113 iv  
 Shoal water, effect of, on speeds of ships.....281, 283, 329 iv  
 Shock, influence of, on propeller efficiency.....611 iv  
 Shrinkage, in fitting built-up crank shafts.....9 iii  
*Sicilia*, 604 iii; machinery details, 410 viii; Orsat combustion tester, 583  
 viii; trials, 195 viii.  
 Signals, engine room.....197 iii, 743 iv  
*Sigurd*, particulars and trial.....656 viii  
 Silicon bronze, 498 iii; silicon steel.....507 iii  
 Similitude, laws of, and naval construction.—Normand.....284 vii  
 Sinclair's superheater, description.....368 viii  
*Sinope*, description and trial.....424 ii  
*Sir Henry Bessemer* and *Sir William Siemens*, description and launch,  
 649 viii  
*Sir William Fairbairn*, description and launch.....864 viii  
*Sirius*, 596 iii; coal consumption.....363 vii  
*Skate*, breakdown on trial.....620 viii  
*Skeandhu*, particulars.....77 i  
*Skipjack*, to be strengthened, 234 ii; trial.....236 ii



- Skjold*, launch and particulars.....612 viii  
*Slieve Bearnagh*, description.....641 vi  
 Smith, J. A. B.—The fitting up of a solid crank shaft.....328 iii  
 Smith, W. Stuart.—Boiler shop and plant at the Union Iron Works, San Francisco, 139 ii; discussion on trial trips, 176 iii.  
 Smoke, loss due to, shown to be very small, 268 iv; loss of heat by.....802 iv  
 Smoke pipes, lofty, 453 iii, 175 v, 669 vi; standing and telescopic.....220 i  
*Snapper*, description and trials.....844 viii  
 Soliani, Nabor.—Compound marine boilers, 477 viii; transmission and distribution of power on modern ships, 173 iv; water tight doors, 327 viii, reply to discussion, 344 viii; water tube boilers, 97 vii.  
*Sokol*, description and trials, 833 vii; dimensions.....606 vii  
 Solid and hollow shafts, curves showing relation between.—Durand...507 vii  
*Southwark*, 757 v; particulars of boilers with suction draft, 746 vi; speed, 218 vi.  
*Sovereign*, yacht, description and launch, 659 viii; race with *Monmouth*, 873 viii  
 Space occupied by crank and fly wheel air pumps and by direct driven ones, relative, 549 vi; by machinery of new U. S. cruisers, 249 i.  
 Spangler, H. W.—Friction of the load, 37 i; mechanical equivalent of heat, 39 i; negative slip, 38 i.  
 Spanish Navy, new vessels.....125 iv, 853 viii  
*Spanker*, boiler details, 835 viii; Du Temple boilers put in, 821 vii; trials, 583 ii, 392 viii.  
*Sparrowhawk*, launch, 820 vii; trials.....842 viii  
*Spartan*, trial.....300 iv  
*Spartiate*, description.....827 viii  
 Specifications.—Cooper.....559 v  
 Speed, classified, of British naval vessels, 190 v; curves of ships building for the U. S. Navy, 555 iii; economical, effect of auxiliaries on.—Wheeler, 474 v; most economical, of naval vessels, 654 iv; relative, and power of English battleships, 493 vi; of large fast vessels during several consecutive hours, how to accurately measure the, 93 ii; of ships, effect of shoal water on, 281, 283, 329 iv; of the *Teutonic* and *City of New York*, 431 ii; trials, 587 iv; trials of fast ships, 68, 333 ii, discussion on, 77, 333 ii.  
*Speedwell*, unsuccessful trial.....234 ii  
*Speedy*, comparison of boilers with those of *Satellit*, 394 vi; description, 684 v; Thornycroft's feed regulator, 421 vii; trials and description, 1060 v, 199, 427 vi, 416 vii; weight of boilers, 346, 363 vii.  
*Speedy*, yacht, description and launch.....434, 875 viii  
*Spetzia*.....320 iv  
*Spider*, trials.....179 i  
 Spirally welded tubes.—Aldrich.....207 i  
*Spitfire*, particulars and trials.....843 viii  
 Spontaneous ignition of coal.....577 iii

- Spree*, description and trial.....589 ii
- Squatting of vessels in motion.—Isherwood, 13 i; Mattice.....33 i
- St. George*, description, 134 iii; trial.....198 vi
- St. Louis*, S. S., description and launch, 811 vi, 609 vii; run, 588 viii; trial under Mail Subsidy Act, 843 vii.
- St. Paul*, explosion on, 155 viii; run, 588 viii; trial under Mail Subsidy Act, 843 vii.
- St. Petersburg*, boiler weights and space.....642 viii
- Standard*, description.....434 vii
- Stanton, S. W.—American steam vessels.....633 vii
- Star*, launch and particulars.....841 viii
- Starfish*, trials.....818 vii
- Steam, determination of dryness.—Unwin, 297 viii; hammer *vs.* hydraulic press, 715 v; jacket efficiency, 422 iii; jackets, efficiency of, in triple expansion engines, 486 iv; jackets with improved circulation, 780 iv; measurement of temperatures of.—Jacobus, 115 viii; pipes.—Brett, 347 v; pipes, experiments to determine the cause of explosions.—Wachsmann, 737 vii; pipes, remarks on.—Milton, 522 vii; pipes, tests of wound copper.—Wachsmann, 510 vii.
- Steamboat inspection service, proposed revision of the rules of.....210 iv
- Steamship companies, the large, of the world.....801 iv
- Steam tables and engine constants.—Pray.....845 vi
- Steamers, comparison of typical ocean.—Lincoln, 162 vi; fast ocean.—Elgar, 808 v; light draught, stern wheel, 836 iv; longevity of modern, 1029 v; trial data of.—Lincoln, 590 vi; whaleback, 453 iv.
- Steel, aluminum, 501 iii; basic Bessemer, 112 iv; basic, experiments with, 432 iv; bending tests of, and contraction of area as proof of quality, 764 iv; boiler tubes, reasons for corrosion.—Gibbons, 413 vii; boiler tubes to replace copper tubes in British destroyers, 424 vii; castings.—Hollis, 193 i, —Strickland, 39 v; castings, failure of, for *Maine and Cruiser No. 11*, 83 iv; castings, manufacture of open hearth.—Hall, 185 i; chrome, 503 iii; copper, 504 iii; Harvey process of surface hardening, 591 iii; forgings, crank shafts, 1 iii; forgings, tests of, 6 iii; manganese, 505 iii; nickel, 506 iii; plates, inspection and manufacture.—Hunt, 128 i; limiting sizes of rectangular, 135 i; temperature and tensile strength, 134 i; silicon, 507 iii; steam pipes, remarks on.—Milton, 522 vii; tungsten, 508 iii; *vs.* iron tubes, 1030 v.
- Stern tubes and struts, supports for boring out.....I, 7, 340 v
- Stern wheel river gunboat for French Navy, 523 iv; steamers, light draught, 836 iv.
- Stevenson, H. N.—Discussion on tubulous boilers.....197 ii
- Stickney, H. O.—Discussion of paper on Experiment Station and Engineer School, 466 vii.
- Stop valves, automatic safety, on *Texas*.....592 viii
- Strength of shell and flange plates proposed for steamboat inspection service, 216 iv.

- Strickland, G. D.—Steel castings.....39 v
- Stromeyer, C. E.—Discussion of paper on transmission of heat through tube plates, 458 v; marine boiler construction, 890 v; measurement of feed water by chemical means, 517 viii.
- Sturgeon*, steel to replace copper boiler tubes, 822 vii; trials.....425, 602 vii
- Submarine boat, *Gustave Zédé*, explosion on, 619 vi; new Goubet.....158 viii
- Subscribers .....239 vi, 213 vii, 234 viii
- Suchel*, trial.....428 vi
- Suction draft for boilers.—Gross.....744 vi
- Suez*, particulars.....81 i
- Suez canal, traffic in.....716 v
- Sulphur, elimination of, from iron.....757 iv
- Sultan*, description and trial.....600 vii
- Sumatra*, description.....626, 850 vii
- Sunderland*, general description.....244 ii
- Sunfish*, trials.....822 vii, 181 viii
- Superheated steam, practical use of.....588 iii
- Superheater, value of.....152 i
- Superheaters and superheating, notes on steam:—Patchell.....346 viii
- Surly*, description and trials.....423 vii, 175 viii
- Surprise*, description, 205 vi; trials.....405 viii
- Svetland*, particulars.....607 vii, 200 viii
- Swordfish*, particulars and trials.....618, 843 viii
- Sybilie*, description, 421 ii; description and trial.....304 iv, 519 v
- Sylvania*, description, 191, 443 vii; trials.....843 vii
- Tage*, 313 iv; description and trials.....462 iii
- Talbot*, dimensions, 427 vii; trials.....616 viii
- Talcott, C. G.—Obituary notice .....270 i
- Tangential pressure curves from engine of *City of Paris*, follow.....320 vi
- Tantallon Castle*, description.....193 vii
- Tartar*, trial data.....426 iv
- Tatsuta*, dimensions.....429 vi
- Taylor, D. W.—The causes of the vibrations of screw steamers, 12 iii; speed trials, 587 iv.
- Teazer*, machinery details.....621 viii
- Tegethoff*, description and trial.....421 vi
- Tekoa*, description and voyages.....134 iv
- Telena*, launch.....853 vii
- Temerario*, description.....319 iv
- Temperature, notes on effect of, on certain properties of various metals and alloys, 144 ii; effect of variation of, on strength of metals, 500 iii.
- Temperatures of steam, measurement of.—Jacobus, 115 viii; of tubes in water tube boilers, Yarrow & Co.'s experiments, 138 viii.
- Tempered copper.....497 iii
- Tenare*, dimensions.....148 vii

- Tenasserim*, particulars.....79 i  
*Teniente Serrano*, launch.....611 viii  
*Terpsichore*, description.....596 iii  
*Terrible*, brief mention, 516 v; description, 197 vi, 584 vii; preliminary trials, 613 viii; official trials and breakdown, 811 viii.  
*Terror*, launch.....856 viii  
Test piece for boiler material, size and shape proposed for steamboat inspection service, 214 iv.  
Tests, bending, of steel, and contraction of area as proofs of quality, 764 iv; comparative, of Ward and Cowles boilers, 414 ii, of Ward and Thornycroft boilers, 581 ii; of boiler plate, 132 i; of riveted joints at Watertown arsenal for Bureau of Steam Engineering, 624 iv; of steamer *Meteor*, 227 i; of Worthington pump for New Bedford, 26 ii.  
*Teutonic*, comments on the 528-mile record, 793 iv; description, 167, 361 i, 99 iv; fast time of, 495 iv; speed of, 431 ii.  
*Texas*, 412 ii; description, 177 i, 291, 515 iv; law authorizing construction, 239 i; official trials, 421, 600 vi, 82 viii.  
*Texas*, third class torpedo boats for, description.....729 v, 526 vi  
*Thames*, description.....635 vi  
Theiss, Emil.—Artificial draft and its effects on boiler construction (translated), 349 iii; contract trial of the *Monterey*, 115 v; correcting indicator cards for weight of reciprocating parts, 283 i; protection of propellers, 218 i; discussion on trial trips, 178 iii; Turkish torpedo boats (translated), 113 ii.  
*Thenard*, 30-knot torpedo boat.....192 viii  
Theory of the centrifugal pump.—Leopold.....335, 483 iii  
Thermometers, Bristol and mercury, compared, Jacobus' paper.....115 viii  
*Theseus*, description, 134 iii, 1049, 1054 v; trial.....198 vi  
*Thespia*, description.....630 vii  
*Thetis* .....596 iii  
Thom, John.—Comparison of mechanical drafts, 140 viii; discussion on water tube boilers, 509 viii.  
Thornycroft boilers, circulation in, 349 vi; comparative test of Ward and, 581 ii; feed regulator for, 790 vi, 421 vii; new, 156 vi; on *Barham* and *Bellona*, 391 viii; test of a model, 730 vii; trial of, on the *Cushing*, 580 ii.  
Thornycroft, J. I.—Discussion on arrangement of surface of screw propeller, 319 v; on British naval machinery, 363 vii; on German warships, 556 viii; on water tube boilers, 392 vi, 508 viii; torpedo boat destroyers, 711 vii.  
Thornycroft's screw turbine propeller.....479 v  
*Thrasher*, 820 vii; launch.....181 viii  
*Three Saints* (*Tri Sviatitelia*), description.....211 vi  
Throttling calorimeters, tests.....141 vii  
*Thule*, description.....521 v  
*Thunderer*, trial.....453 v

- Tiradentes*, description.....527 iv  
 Tobin's metal.....494 iii  
*Torch*, description, 203 vi; trials.....601 vii, 172 viii  
 Torpedo Boats.—Argentine, particulars of six, 611 viii; Austrian, *Natter*, 385, 806 viii; *Viper*, 384, 806 viii.  
     Brazilian, built by Thornycroft, 608 iii; built by Schichau.....418 vii  
     Chilian, 611 viii; Chinese, two.....162 viii  
     Danish, *Hajen*.....612 viii  
     English, *Daring*, 517 v; *Decoy*, 517 v; *Havock*, 517, 655, 1056 v; *Hornet*, 517, 655 v; new, 834 iv; *Nos. 91, 92 and 93*, 615 vi; *Nos. 94 and 95*, 805 vi; *No. 97*, 483 v, trial, 616 vi; *Sunderland*, 244 ii; time necessary to build, 117 iv; trial of liquid fuel, 183 i.  
     French, 184 i; aluminum, 786 vi; *Aquilon*, description, 191 viii, trials, 405 viii; *Argonaute*, 619 vi; *Cassini*, 430 vii; *Chevalier*, 585 vi; *Cyclone*, 850 viii; *Durandal*, 850 viii; *Flibustier*, 430 vii; *Forban*, 429 vi; *Hallebarde*, 850 viii; *Lansquenet*, 1063 v, 206, 807 vi, trials and breakdown, 430 vii; new, 843 iv; *No. 73*, 430 vii; *No. 149*, 491 iv; *No. 192*, 430 vii; *Nos. 126, 127, 128 and Avant Garde*, description and economy trials.—Normand, 273 iii; *Tourmente*, 619 vi.  
     German, sea-going, six.....850 viii  
     Italian, *Aquila*, accident to machinery, 605 vii; particulars of one, 635 viii  
     Norwegian, three.....200 viii  
     Spanish .....181 i  
     Turkish.....113 ii, 284 iii  
     United States, *Cushing*, 127, 215 ii; *Ericsson (No. 2)*, 409, 411 ii, 127, 260, 460, 595 iii, 421, 793 vi, 572 vii; *Nos. 3, 4 and 5*, 795 vi, 152 vii; *No. 3*, 799 viii; *Nos. 6, 7 and 8*, 583, 805 vii; *No. 6*, 800 viii; *Nos. 9, 10 and 11*, 599, 800 viii; *Nos. 12 to 18*, 601, 801 viii; *third class*, for *Maine and Texas*, 729 v; for *Maine*, 24 vii.  
     Various navies, fast, 835 iv; very fast, for Italy and Russia, built by Schichau, 845 iv.  
 Torpedo boat destroyers.—Thornycroft and Barnaby, 711 vii; British 30-knot, 820 vii, 186, 400, 622 viii; British 32-knot, 401 viii; Chilian, 811 vii; comparison of five.—Thornycroft, 422 vii; editorial on speed of (*Engineering*), 796 vii; new requirements for trial of British, 399 viii; Russian, 201 viii; *Sokol*, 606 vii, description and trial, 833 vii; Spanish, 202 viii; Turkish, 810 vi.  
*Torpedo Cruiser No. 1*, U. S., 409 ii; description.....411 ii, 127 iii  
 Torpedo gunboats.—British Navy, 598 iii; *Alarm*, 832 iv; *Dryad*, *Halcyon*, *Harrier*, *Hazard*, *Hussar*, *Jaseur*, 833 iv; *Leda*, *Onyx*, 832 iv; *Plassy*, 421 ii; for England and other countries, with data of sizes and speeds, 301 iv; machinery of, 339 vii.  
*Touraine*, la, 611 iii; indicator diagrams.....134 iv  
*Tourmente*.....619 vi  
 Towne, N. P.—Discussion on air pumps, 765 vi; fitting pipes and strainers to bilge pumps, 215 i; on trial trips, 156 iii.

- Trafalgar*, description and trials, 254 i; horse power and speed.....491 vi  
 Training ships for engineer's force, *Banshee*, *Ferret* and *Lynx*, 821 vii;  
*Sharpshooter*, 822 vii.  
 Transatlantic record, 494, 792 iv; westward.....569 vii  
 Transmission and distribution of power on modern ships.....173 iv  
*Trave*, broken shaft of.....188 v  
*Tréhouart*, description.....422 ii, 750 v  
*Trenton*, data of hull and machinery.....735 iv  
 Trials, Battleship, British, 177 vi; British Admiralty requirements for  
 new destroyers, 399 viii; contract, of French naval vessels, require-  
 ments, 481 iv; notes on analysis of engine, 510 ii; of fast ships, speed,  
 68, 333 ii, discussion, 77 ii; of Thornycroft boilers on the *Cushing*,  
 580 ii; official, of vessels of U. S. Navy.—Table, 582 iii; progressive,  
 of typical ships of British Navy, 303 iv; speed, 587 iv; speed, register  
 for, 86 iii.  
 Trials, *Aco*, 441 vii; *Adler*, 426 ii; *Admiral Oushakoff*, 839 vii; *Alarm*,  
 748 v, 200 vi; *Alert*, 428 vii, 172 viii; *Algerine*, 393 viii; *Alma*, 191,  
 441 vii; *Almy*, 131 iv; *Almirante Condell* and *Almirante Lynch*, 585  
 ii; *Almirante Oquendo*, 841 vii, 638 viii; *Almirante Simpson*, 611 viii;  
*Amiral Tréhouart*, 403, 625 viii; Aluminum torpedo boat, 786 vi;  
*Anakreon*, 426 ii; *Andrea Doria*, 423 ii; *Antelope*, 200 vi; *Aquilon*,  
 405 viii; *Arcturus*, 213 viii; *Asturia*, 649 viii; *Ardent*, 168, 423 vii;  
*Aretusa*, 208 vi; *Astræa*, 199 vi; *Atlanta*, 353, 357 i; *Australia*, 180 i.  
*Baltimore*, 337 i, 122 ii; *Banshee*, 425 vii; *Barfleur*, 182, 197 vi; *Bar-*  
*ham*, 421 ii, 743 v; *Barracouta*, 232 ii; *Barrosa*, 583 ii; *Basilisk*, 357  
 i; *Bathurst*, 142 iii; *Beagle*, 357 i; *Bennington*, 206 iii; *Blake*, 121  
 iv, 168 viii; *Blanco Encalada*, 603 vi, 154 vii; *Blenheim*, 306, 831  
 iv; *Bonaventure*, 803 vi; *Boston*, 354 i; *Bouvines*, 604 vii, 403 viii;  
*Boxer*, 169, 715 vii; *Brennus*, 186 viii; *Brilliant*, 832 iv; British Medit-  
 erranean fleet, 795 viii; *Brooklyn*, 727 viii; *Bruiser*, 419 vii; *Buenos*  
*Aires*, 809 vii; *Bugeaud*, 404 viii.  
*Caprera*, 832 vii; *Capitan Muniz Gamero* and *Capitan Orella*, 807 viii;  
*Capitan Prat*, 231 v; *Carnot*, 625 viii; *Cassabianca*, 405 viii; *Cassini*,  
 430 vii, 191, 405 viii; *Castine*, 846 v; *Cécille*, 180 i, 135 iii; *Centurion*,  
 1044 v, 182 vi; *Charles Martel*, 847 viii; *Charleston*, 310 i; *Charybdis*,  
 605 vi; *Chasseloup-Laubat*, 429 vii; *Chesapeake*, 853 vii; *Chevalier*,  
 589 vi; *Chicago*, 354 i; *Circe*, 512 v, 200 vi; *Coetlogon*, 618 vi; *Col-*  
*chester*, 340 ii, 426 iv; *Columbia*, 1034 v, 37 vi; *Concord*, 578 ii, 89 iii;  
*Contest*, 424 vii; *Corcovado*, 865 viii; *Cushing*, 221 ii, 459 iii.  
*Daphne*, 86 i; *Daring*, 610 vi; *Daring*, *Decoy*, *Ardent*, *Boxer* and  
*Bruiser*, comparison, 422 vii; *Davout*, 600 iii; *Decoy*, 804 vi; *Des-*  
*cartes*, 626, 849 viii; *Desperate*, 399, 842 viii; *Detroit*, 500 v; *Devas-*  
*tation*, 1048 v; *Diana*, 833 viii; *D'Iberville*, 806 vi; *Dragon*, 424 vii;  
*Dryad*, 614 vi; *Dunvegan Castle*, 866 viii; *Dupuy de Lôme*, 516 iv,  
 150, 429 vii.

## Trials.

- Eclipse*, 615 viii; *Edgar*, 122 iv; *Elba*, 831 vii; *Empress of India*, 182 vi; *Endymion*, 745, 747 v; *Entre Rios*, 804 viii; *Ericsson*, 793 vi, 572 vii; *Errazuriz, Presidente*, 528 iv; *Espora and Rosales*, 285 iii; *Etruria*, 198 viii.
- Fei Ying*, 811 vii; *Ferret*, 613 vi; *Fieramosca*, 236 ii; *Fleurus*, 150, 173 vii; *Flibustier*, 430 vii; *Flora*, 605 vi; *Forban*, 826 vii; *Forbin*, 180, 360 i; *Fox*, 802 vi; *Franz Josef I*, 136 iii; French cruisers, 150 vii; *Friant*, 807 vi, 171, 429 vii, 375 viii; *Fusi Yama*, 340 ii, 426 iv.
- Galatea*, 743 v; *Garibaldi*, 803 viii; *George the Victorious*, 635 viii; *Geier*, 192, 631 viii; *Geiser*, 165 v; *Gibrallar*, 738 v; *Gleaner*, 120 iv; *Gossamer*, 598 iii; *Grasshopper*, 261 i; Gunboat, stern wheel, river, for French Navy, 523 iv.
- Halcyon*, 614 vi; *Handy*, 396 viii; *Hardy*, 620 viii; *Harrier*, 803 vi; *Hart*, 180, 396 viii; *Haughty*, 180, 397 viii; *Havock*, 1056 v, 426 vii; *Hazard*, 426 vi; *Hebe*, 200 iv; *Hercules*, 220 v; *Hermione*, 815 vii; *Hoche*, 269 iii; *Hohenzollern*, 431 vii; *Hood*, 182 vi; *Hornet*, 424 vi, 426 vii; *Hunter*, 396 viii.
- Ignazio Florio*, 869 viii; *Inchmona*, 654 viii; *Indefatigable*, 120 iv; *Indiana*, 421 vi, 637 vii; *Infanta Maria Teresa*, 960 v, 628 vi; *Iona*, 374 iii, 426 iv; *Itsukusima*, 145 iii.
- Janus*, 835 viii; *Jaseur*, 200 vi; *Jason*, 200 vi; *Jauréguiberry*, 403, 624 viii; *Jemmapès*, 805 vi, 402 vii.
- Kaiserin Augusta*, 846 iv, 627 viii; *Kaiserin and Königin Maria Theresia*, 153 vii; *Katahdin*, 804 vii, 1 viii; *Kherson*, 639 viii; *Komet*, 828 vii.
- Landrail*, 261 i; *Lansquenet*, 807 vi, 430 vii; *Lapwing*, 260 i; *Latona*, 266 iii; *Latouche-Tréville*, 150, 172, 429 vii; *L. C. Waldo*, 858 viii; *Leda*, 1060 v, 200 vi; *Lévrier*, 845 iv; *Libertad*, 230 v; *Lieutenant Kasarsky*, 426 ii; *Lightning*, 172, 835 viii; *Liguria*, 199 viii; *Lombardia*, 198 viii; *Lynx*, 614, 805 vi, 821 vii.
- Machias*, 720, 846 v; *Magicienne*, 178, 255 i; *Magnet*, 805 viii; *Magnificent*, 811 vii; *Magpie*, 261 i; *Maine*, 792 vi, 1 vii; *Majestic*, 812 vii, 811 viii; *Marathon*, 256 i; *Marblehead*, 129 vi; *Marceau*, 273 iii; *Marco Polo*, 633 viii; *Margarita*, 873 viii; *Maria Theresia*, 153 vii; *Massachusetts*, 238 viii; *Medea*, 87, 255 i; *Medusa*, 178 i; *Melampus*, 460 iii; *Melpomene*, 257 i; *Meteor*, 426 iv; *Minerva*, 832 viii; *Minneapolis*, 598, 702 vi; *Missiones*, 805 viii; *Monarch*, 802 vi; *Monsoon*, 629 vii.
- Natter*, 806 viii; *Newark*, 99 iii; *New Hampshire*, 323 iv; *New York*, 499 v, 613 v; *Niger*, 743 v; *Norman*, 178 vii; *Normannia*, 237 ii; *Nueva de Julio*, 501 v; *Nymphe*, 86 i.
- Olympia*, 1033 v, 241 vi, 581 viii; *Onyx*, 200 vi; *Opossum*, 397 viii; *Oregon*, 602 vi, 439 viii; *Orel or Oriel*, 237 ii.
- Pallas*, 268 iii; *Partenope*, 423 ii; *Pascal*, 849 viii; *Patria*, 800 vi; *Pearl*, 269 iii; *Pelayo*, 283 iii; *Petrel*, 355 i; *Phaeton*, 392 viii; *Philadelphia*,

## Trials.

- 231, 412, 524 ii; *Phæbe*, 598 iii; *Phæni.v.*, 170 viii; *Piemonte*, 181, 263 i; *Piet Hein*, 194 viii; *Pinto, Presidente*, 528 iv; *Pique*, 216 v; *Pomona*, 436 vii; *Porcupine*, 398, 835 viii; *Possadnik*, 228, 752 v; *Powerful*, 613, 812 viii; *Presidente Errazuriz*, 528 iv; *Presidente Pinto*, 528 iv; *Prince George*, 809 viii; *Prinz Heinrich*, 437 vii; *Prinz Regent Luitpold*, 437 vii; *Puri*, 644 viii.
- Rainbow*, 216 v; *Raleigh*, 298 viii; *Ramillies*, 515, 741 v, 182 vi; *Ranger*, H. M. S., 397 viii; *Reina de los Angeles*, 652 viii; *Renard*, 1061 v, 200 vi; *Renown*, 387 viii; *Repulse*, 512 v, 182 vi; *Resolution*, 1039 v, 182, 489 vi; *Retribution*, 216 v; *Rè l'umberto*, 207 vi, 195 viii; *Revenge*, 182, 188 vi; *Ringdove*, 422 ii; *Rocket*, 805 vi, 424 vii, 179 viii; *Rosales*, 285 iii; *Royal Oak*, 182, 187 vi; *Royal Sovereign*, 295 iv, 182 vi; *Rurik*, 433 vii.
- Salmon*, 817 vii; *Samoyede*, 840 vii; *Sandfly*, 179 i; *San Francisco*, 413, 537 ii; *Sanspareil*, 84 i; *Santa Fè*, 609 viii; *Sappho*, 830 iv, 218 v; *Sardegna*, 620 vi, 173 vii; *Scottish Hero*, 852 vii; *Scylla*, 218 v; *Seagull*, 234 ii, 715 v; *Shark*, 424 vii, 179 viii; *Sharpshooter*, 262, 357, i, 822 vii, 379 viii; *Sicilia*, 195 viii; *Sigurd*, 656 viii; *Sinope*, 236, 424 ii; *Snapper*, 844 viii; *Sokol*, 833 vii; *Spanker*, 583 ii, 392 viii; *Sparrowhawk*, 842 viii; *Spartan*, 300 iv; *Speedwell*, 234 ii; *Speedy*, 1060 v, 199, 427 vi, 416 vii; *Spider*, 179 i; *Spitfire*, 843 viii; *Spree*, 589 ii; *Starfish*, 818 vii; *St. George*, 198 vi; *Sturgeon*, 425, 602 vii; *Suchet*, 428 vi; *Sultan*, 600 vii; *Sunderland*, 247 ii; *Sunfish*, 822 vii, 181 viii; *Surly*, 424 vii, 179 viii; *Surprise*, 405 viii; *Swordfish*, 618, 843 viii; *Sybille*, 304 iv, 519 v; *Sylvania*, 848 vii.
- Tage*, 462 iii; *Talbot*, 616 viii; *Tartar*, 340 ii, 426 iv; *Terrible*, 613, 811 viii; *Texas*, 421, 600 vi, 82 viii; *Theseus*, 198 vi; *Thunderer*, 453 v; *Torch*, 601 vii, 172 viii; *Torpedo boat destroyers*, British, 796 vii, Thornycroft, 422 vii; *Torpedo boats*,—British, Nos. 91, 92 and 93, 615 vi, No. 97, 616 vi,—French, 273 iii, *Lansquenetz*, 430 vii, No. 149, 492 iv, No. 192, 430 vii,—U. S., *Ericsson*, 572 vii; *Trafalgar*, 254 i; *Troude*, 270 iii.
- Umbria*, 809 vi, 197 viii; *Undaunted*.....235 ii
- Valkyrien*, 851 viii; *Vautour*, 236 ii; *Veinte Cinco de Mayo*, 140 iii; *Venus*, 830 viii; *Vesuvius*, 82 i, 231, 417 ii; *Victoria*, 84 i; *Victorious*, 808 viii; *Victory*, 765 vii; *Ville de Douvres*, 409 iv; *Viper*, 384 viii; *Viscaya*, 810 vi; *Vulcan*, 461 iii, 514 v.
- Wallaroo*, formerly *Persian*, 129 iii; *Wampanoag*, 713, 735 iv; *Wattignies*, 844 iv; *White's patent steam turnabout life launch*, 225 ii; *Widgeon*, 235 ii; *Wojewoda*, 228 v; *Werth*, 808 vi, 430 vii.
- Yorktown*, 137, 355 i; *Yoshino*.....1068 v
- Zenith City*.....765 vii
- Trial trips.—McFarland, lecture on .....33 vii
- Trial trips and the lessons to be learned from them.—McFarland, 149 iii; discussion, 156 iii.



- Tribune*, 596 iii; description.....264 iii
- Triple expansion engine, advantages and disadvantages for war vessels, 718 iv; experimental comparison of a single cylinder engine with.—Isherwood, 271 v.
- Triple expansion pumping engines, experiments on.—Isherwood.....215 vii
- Triple screws.....289, 315, 516, 839 iv, 3 vi
- Triple screw vessels, *Chateaurénauld*, 825 vii; *Columbia*, 1 vi; *Ersatz Freya*, 828 vii; *Ersatz Leipzig*, 827 vii, 406, 550 viii; *Favorite*, steamer, 438 vi; *Gaulois*, 848 viii; German warships, eight new, 550 viii; *Guichen*, 825 vii; *Jeanne d'Arc*, 188 viii; *Kaiser Friedrich III* (*Ersatz Preussen*), 827 vii, 627, 550 viii; *Kaiserin Augusta*, trials, 846 iv, 627 viii; *K* and *L*, German, 828 vii, 550 viii; *M* and *N*, German, 551, 631 viii; *Masséna*, 603 vii; *Minneapolis*, 598 vi; *Rossija*, 433 vii, 637 viii; *Saint Louis*, 847 viii.
- Triple screw vessels, opinion of Prof. Carl Busley.....782 viii
- Tripoli*, boilers.....410, 413 vi
- Troop ships, English, age, 168 vi; speed.....168 vi
- Troude*, description and trial.....270 iii
- Truma*, particulars.....430 viii
- Tube plates, Kirk's experiments with different thicknesses of, 33 v; transmission of heat through.—Durstun, 436 v.
- Tube sheets, elasticity of, 451 iii; rational design of, for boilers with forced draft, 787 iv.
- Tubes, boiler, Admiralty tests for, 814 viii; boiler, arrangement in *Barham* and *Bellona*, 333 v; boiler, iron *vs.* steel, 488 iv; boiler, leaky, 507 iv; comparative trials of boilers fitted with the "Serve" and the ordinary boiler, 569 ii; condenser, of *Baltimore*, deterioration, 114 iv; expanding by steam and electricity.—Yarrow, 589 viii; ferruled, in boilers of British Navy, success of, 837 iv; manufacture and inspection of iron and steel boiler, 301 ii; Serve's boiler, conditions for maximum efficiency, 288 iv; Serve, tests of, 785 vi; Serve, with suction draft, 748 vi; spirally welded, 207 i; steel boiler, reasons for corrosion, 413 vii; steel *vs.* iron, 1030 v; temperature of, Yarrow & Co.'s experiments, 138 viii.
- Tubulous boilers.—Leonard, 163 ii, discussion, 180, 371, 555 ii; in the French Navy.—Robison, 365 vii.
- Tungsten steel.....508 iii
- Turbine, Parson's steam.....899 v
- Turbine propeller, Thornycroft's screw.....479 v
- Turkish gunboats, 810 vi; torpedo boats.....113 ii
- Turnabout life launch, the White patent steam.....222 ii
- Turning effort on the crank shaft of an engine.—Bryan.....334 vi
- Turret Cape*, description and trial.....620 vii
- Turret turning gear of *Brooklyn*, 758 viii; *Maine*, 23 vii; *Massachusetts*, 261 viii; *Oregon*, 466 viii; *Texas*, 85 viii.

- Ulster*, description and launch.....657 viii
- Umbria*, particulars and trials, 809 vi, 197 viii; speed and I.H.P.....620 vi
- Umbria*, S. S., best speed, 1019 v; comparison of trial with calculated I.H.P.—Warrington, 267 vi; progressive trials, 293 iii; repairing shaft of, 185 v.
- Union Dry Dock Co., lake steamer building by, dimensions.....208 viii
- Unique*, description.....430 vi
- Unwin, W. C.—Determination of the dryness of steam, 297 vii, reply to discussion, 325 vii; tests of Delta white anti-friction metal, 717 v.
- Urania* .....604 iii
- Urania*, yacht, description.....629 vii
- Valiant*, yacht, 759, 1078 v; run from New York to Gibraltar.....223 vi
- Valkyrie*, yacht, dimensions, 1004 v; races with *Vigilant*.....1005 v
- Valkyrien*, description and trial.....851 viii
- Valmy*, description.....235 ii
- Valve chest, repairing a broken, on the *Concord*.—Norton.....761 vi
- Valve gear, Marshall, 1 ii; memoranda regarding invention of.....248 ii
- Valve gears, radial.....525 iii
- Valve, slide, inertia stresses of.—Macalpine.....272 vi
- Vandalia*, description, and effect of foul bottom on speed.....73 i
- Vaporized oil motor, weight and power of.....582 vi
- Vautour*, trial.....236 ii
- Veglia*, description.....628 vii
- Veinte Cinco de Mayo*, description and trial.....140 iii
- Vendenesse*, aluminum yacht.....165 vi
- Venus*, launch and description, 815 vii; trials and description.....830 viii
- Vertical engines, reasons for general adoption.....724 iv
- Vesuvius*, description and trials, 82 i, 231, 417 ii; law authorizing construction, 242 i; machinery space, 249 i; particulars of machinery, follow 652 v.
- Vibration, engine, 977 v; of screw steamers, the causes of, 12 iii; of vessels and means of avoiding by balancing engines, 246 iv.
- Vicksburg*, 799 viii; bids and contract, 804 vii; description.....581 viii
- Victoria*, sinking of, 693 v, 47 vi; trials.....84 i
- Victorious*, dimensions, 423 vi; launch and weights, 813 vii; trials.....808 viii
- Victory*, description and trials.—Bryan.....765 vii
- Vienna*, description and trial.....834 vi
- Vierny*, launch and dimensions.....200 viii
- Vigilancia*, speed.....217 vi
- Vigilant*, yacht, description, 652 v; dimensions, 998 v; races with *Valkyrie*, 1005 v.
- Ville de Douvres*, trial, 409 iv; trials, analysis of.....539 iv
- Vindictive*, dimensions, 419 vii; particulars.....170 viii
- Viper*, description and trials.....384, 806 viii
- Virago*, 820 vii; launch.....181 viii

- Viscaya*, 360 i, 606 iii; trials.....810 vi  
*Vittor Pisani*, description.....830 vii  
 Voorhees, P. R.—Discussion of paper on Experiment Station and Engineer School, 475 vii.  
 Voorhees, P. R.—Obituary notice..... 218 viii  
*Vulcan*, torpedo depôt and repair ship, 75 vii; defective boilers, 118 iv; description, 820 iv; trials and description, 461, 599 iii, 514 v.  
*Vulture*, general data.....820 vii
- Wachsmann, W.—Experiment to determine causes of explosion of steam pipes, 737 vii; tests of wound copper pipes, 510 vii.  
*Wachusett*, particulars.....663 viii  
 Wake currents, measurement of.....869 v  
 Walker, William G.—Arrangement of the surface of a screw propeller, 300 v  
*Wallaroo*, formerly *Persian*, description and trial.....129 iii  
 Walliker, John F.—Discussion on marine boiler furnaces.....418 v  
*Walter Q. Gresham*, launch.....803 viii  
*Wampanoag*, description and trial, 713, 735 iv; particulars of machinery, follow 652 vi.  
 War College lectures, by Edwards, liquid fuel, 744 vii, Naval Engineer officers and the problem, 21 viii; by McFarland, 647 vi, 33 vii.  
 Warburton, E. T.—Discussion of paper on Experiment Station and Engineer School, 469 vii; on speed trials of fast ships, 84 ii; the contract trial of the *San Francisco*, 537 ii.  
 Ward boiler, comparison of test with that of the Cowles, 414 ii; with that of the Thornycroft, 581 ii.  
 Ward, Charles.—Discussion on tubulous boilers.....198, 558 ii  
 Warship construction, effect of the battle of Yalu on.—Ferrand.....370 viii  
 Warships, the machinery of British.—Durstun .....332 vii  
 Warren, B. H.—Modern cranes.....921 v, 147 vi  
 Warrington, J. N.—The propulsive power of screw ships.....259 vi  
 Water hammer, experiments to determine effect of, on steam pipe explosions, 737 vii; water rams in steam pipes, 407 iii.  
 Watertight doors, British Admiralty minute on closing, 87 vi; by Beresford, 319 viii; by Soliani, 327 viii.  
 Water tube boilers, by Milton, 357 vi; by Soliani, 97 vii; by Watt, 481 viii; circulation in.—Watkinson, 489 viii; for marine purposes.—Milton, 931 v; on temperature of tubes in, 138 viii; types adopted in German Navy, 553 viii; *vs.* cylindrical boilers, 373 vi; Yarrow & Co.'s experiments on circulation in, 133 viii.  
*Wattignies*, description, 280 iii; trial.....844 iv  
*W. D. Rees*, launch and description.....209 viii  
 Weaver, W. D.—Discussion on speed trials of fast ships, 79 ii; on trial trips, defects in indicators, &c., 436 iii; register for speed trials, 86 iii; revolution recorder on trial of *Bancroft*, 377 v; some problems in propulsion, 59 i.

- Webster, H.—Discussion on trial trips, 163 iii; screw propellers of U. S. naval vessels, 157 iv; some new alloys considered in their chemical and physical aspects, 489 iii.
- Webster's clinometer.....348 iii
- Weir's evaporator.....491 vii
- Weight and power, relative, of electric, compressed air and vaporized oil engines, 582 vi.
- Weight, launching, of *D'Entrecasteaux*, 626 viii; *Hannibal*, 612 viii; *Illustrious*, 810 viii; *Pennsylvania*, 862 viii.
- Weight of boilers, comparative, of cylindrical, locomotive and water tube, 121 vii, on some British vessels, 567, 568 viii; cylindrical of *New York*, 661 vi; cylindrical and water tube of *Kherson*, *Renown* and *St. Petersburg*, 639 viii; cylindrical and water tube of *Monterey*, 662 vi; locomotive and Thornycroft, 350 vi; Blechynden, of *Scud*, 874 viii; D'Allest, of *Carnot*, 385 vii; Du Temple, of *Spanker*, 835 viii; of torpedo boats, 787 viii; Niclausse, of *Cristobal Colon*, 854 viii; Thornycroft, of *Geiser*, 167 v, of *Speedy*, 350, 394 vi; Ward, of *Monterey*, 134 v.
- Weight of hull and machinery of *Majestic*, 167 vii; *Victorious*.....813 vii
- Weight of machinery of *Ariete*, 183 i; bed plates and engine framing per I.H.P., 565 viii; British warships.—Durstun, 348, 364 vii; *Bugeaud*, 409 vii; *Charleston*, 320 i; *Chasseloup-Laubat*, 409 vii; *Daring*, 725 vii; *Friant*, 409 vii; *Ignazio Florio*, 869 viii; *Kassarsky*, 171 v; *Magicienne* and class, 87 i; *Maine*, 26 vii; *Marco Polo*, 634 viii; *Medea* and class, 87 i; *Norman*, 191 vii; representative modern steamers, naval and mercantile, 567 viii; *San Francisco*, 723 iv; *Satellit*, 394, 423 vi; *Trenton*, 723 iv; *Yorktown*, 143 i.
- Welded steel steam pipes.—Hill.....731 vi
- Welding, electric.....774 vi
- Wells, Edwin.—Obituary notice.....96 i
- Whaleback steamers, 453 iv; building on the Pacific, 868 iv; built in England, 762 v.
- Wheeler, F. M.—Effect of auxiliaries on economical speed, 474 v; discussion on air pumps, 546 vi.
- Wheeling, 799 viii; bids and contract, 804 vii; description.....583 vii
- White's patent steam turnabout life launch. ....222 ii
- White, W. H.—Discussion on German men-of-war, 555 viii; on watertight doors, 356 viii; on water tube boilers, 957 v; effect of depth of water on speed of ships, 281 iv; experiments with basic steel, 432 iv; first class battleships, 464 vi, further experience with, 538 vii; loss of H.M.S. *Victoria*, 37 vi.
- Whitaker, E. J.—Obituary notice.....635 vii
- Whitham, J. M.—Use of retarders in boilers.....777, 779 vii
- Whiting, torpedo gun boat, description.....358 i
- Whiting, 30-knot destroyer, launch and particulars.....841 viii
- Widgeon, trial.....235 ii
- Wien, launch.....811 vii

